



# EXPERIMENT STATION RECORD.

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## EXPERIMENT STATION RECORD.

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No. 5.

Record has already been made in these pages of the untimely death of Dr. M. A. Scovell, director of the Kentucky Experiment Station and head of the agricultural department of the State University. But the position of this man and the high esteem and affection in which he was held demand for him more than formal notice.

Melville Amasa Scovell was born at Broadway, N. J., February 26, 1855. At the time of his death, therefore, on August 15 last, he was in his fifty-eighth year. His apparent recovery from his sickness of a few years ago, and the general robustness and vigor which characterized him, gave him the appearance of being in the prime of life and seemed to promise many years of service. His taking away at a time when the results of so many years of labor were coming into fruition and the outlook for the future was so bright seemed especially to be regretted. But he lived to see his ambitions realized in an attitude of public appreciation for agricultural education and research in his State, permanent financial support for them, and an equipment for the experiment station equalled in few States. These were in an unusual measure the product of his own labors, and will remain a monument to his memory.

Dr. Scovell's collegiate work was done at the University of Illinois, then the State Industrial University, where he graduated in 1875 with the degree of B. S., specializing in chemistry. He remained with the university for seven years after graduation, being successively instructor in chemistry, assistant professor, and later professor of agricultural chemistry. He received the degree of M. S. from the university in 1877, and of Ph. D. in 1908. While at the university he gave considerable study to the production of sugar from sorghum, working out with the late Prof. H. A. Weber a method for obtaining sugar from this plant in quantities which at prevailing prices was thought profitable. In 1883 and 1884 he was superintendent of the Kansas Sugar Works at Sterling, Kans., and the following year was special agent for this Department in the erection of diffusion batteries for extracting sugar from sorghum and sugar cane in Kansas and Louisiana.



The Kentucky Agricultural Experiment Station was established in the summer of 1885 and Professor Scovell was elected as director, assuming his duties in November of that year. His continuous period of service as director for twenty-seven years is exceeded by only one case, that of Dr. E. W. Hilgard of California. It places the Kentucky Station in the unique position of having suffered no change in its administrative head since its establishment, a fact which is the more remarkable when the frequent change at most of these institutions in the early days is considered.

The beginning of the station was a meager one, and its resources were very limited. There were no special funds for its maintenance, and little in the way of facilities and equipment. One large room in the basement of the college building was assigned to the station, and this by subdivision was made to serve as office, chemical laboratory, and balance room. About twelve acres of land, all the tillable land the college then had, was assigned to the station for field experiments. The director was the only person whose time was devoted exclusively to the station work, and upon him devolved in large measure both the planning and the execution of the work.

In 1886 the legislature so modified the existing law relating to the sale of commercial fertilizers as to place the station in charge of the fertilizer control and give it the benefit of the fees. This was the first formal recognition of the station as a state institution. The following year a farm of about forty-eight acres was added, and a station building was provided in 1888. A second farm of sixty-four acres was acquired in 1898, to provide increased facilities for the field and feeding experiments, and subsequently other additions were made until the station fields assumed their present generous proportions.

To the fertilizer control was later added the state food control and the feeding stuff, nursery stock, and seed inspection, which provided a steadily increasing revenue. While these inspection duties made large demands upon the station, the work was so organized as not to interfere seriously with the experimental work, and new departments were added as the funds permitted. In 1905, the station having outgrown its quarters a new building, thoroughly modern and complete in all its appointments, was erected. This in time also became inadequate, and the past year an addition, larger than the original structure and costing about \$50,000, was begun.

During these years much of the time and effort of Professor Scovell were occupied in securing and preparing for use the buildings and land which he felt were required for the proper equipment of the station. These were provided in very large measure out of the earnings of the station, without specific state appropriation. This called for a high order of executive ability and business management.

Although the revenue of the station in 1911 reached over \$125,000, it was derived, except for the federal funds, from the earnings of the station in the laboratory and on the farm. By economy and good management Dr. Scovell had been able to save from these yearly earnings the funds needed for building up the physical equipment without calling on the State for aid.

He realized, however, that the State should make definite provision for the station, and one of the closing features of his career was securing from the legislature last winter a permanent appropriation of \$50,000 per annum for the use of the station in its experimental work and to provide for extension teaching. This was a notable achievement, and showed the confidence and support he had won from the people of the State. It placed the station in excellent financial condition, which would have enabled him in future to have focused his attention on the further development of the station along research lines. This development he had already set in motion, and his plans would soon have made the Kentucky Station conspicuous in that field.

To this extent, then, Dr. Scovell's greatest work was perhaps as an able administrative officer, a builder of public sentiment, a provider of opportunity for the work of others. But with a keen insight into the needs of the agriculture of the State he instituted and conducted personally experiments covering a wide range of subjects, including the culture and fertilizing of staple crops, the growing and curing of tobacco, and the handling of dairy cattle; and he planned for and directed the activities of the members of his staff along many important lines of experiment and inquiry.

This staff, of which he was the principal working member at the outset, had reached over thirty in number at the close of his career, all of whom devoted practically their entire attention to the station's work. His position as the leader of this group is well expressed in the appreciative resolutions of his coworkers, which declare that "to all of us he was not only the inspiring, helpful director, doing all in his power to stimulate and encourage and support the various departments of the station and the agricultural college, but more than all else the gentle, kindly, sympathetic friend."

With the reorganization of the State University in 1910, Dr. Scovell was urged to assume the direction of the college of agriculture, a task which his deep interest in the upbuilding of agriculture induced him to undertake in addition to his other duties. The progress of the new college of agriculture in two years has been most gratifying, and has reflected credit upon his organizing and administrative skill. Provision for its permanent maintenance, like that of the experiment station, came as one of the closing efforts of his life, the legislature of last year voting the university an appropria-

tion of \$50,000 per annum for maintenance, in which the college of agriculture is to share.

Dr. Scovell's activity was by no means confined to the duties of his own institution. He was an unusually public-spirited man, giving freely of his interest and his time to various local enterprises, and displaying a high order of ability in securing results. He was a leading spirit in the community, and one on whom much dependence was placed. In a national way, he was prominently identified with the leading movements for agricultural advancement. From the time he came into the Association of American Agricultural Colleges and Experiment Stations in 1889 until the close of his life there was hardly a year when he did not serve the association in some capacity, either as an active officer or a member of one or more of its committees. He was a member of the executive committee from 1889 to 1895, and was secretary and treasurer from 1890 to 1894. He was president of the association in 1909, but was prevented by illness from presiding at the convention of that year.

His most conspicuous service was as chairman of a committee nominated by the association to supervise the tests of dairy cows at the World's Columbian Exposition, in 1893. This was one of the most remarkable breed tests ever conducted, being upon a scale and with a thoroughness never before approached. The management of the tests was practically in the hands of the committee, which developed methods and system, made a detailed record of the feed and of the performance of the individual cows, and computed the results. The records contained nearly three million separate entries of fact, and were deemed a very important contribution to the literature of dairying, but owing to the expense of their publication they were never printed in detail.

Much of the responsibility for the conduct of these tests with such thoroughness, fidelity, and skill naturally devolved upon the chairman of the committee, who was also called upon to handle many delicate matters in relations with the competing breeders and authorities. He gave to it much of his time and strength during a large part of the year, and the occasion was the beginning of the association of his name with dairy cattle in a national way. The success of the elaborate precautions adopted to secure absolute fairness and accuracy is attested by the fact that from no reputable source has the least doubt been cast upon the accuracy of the results.

Dr. Scovell's position as an expert in dairy cattle led him to be sought as manager of the Jersey herd at the St. Louis World's Fair test, and also to be offered the position of secretary of the American Jersey Cattle Club, both of which he declined. He was recently elected a director of the latter club. Less than two years ago he

rendered much assistance in establishing the Jersey herd of Elmen-donk Farm, making a trip abroad for the purpose, and selecting high-priced animals in this country. He was also in demand as a judge at fairs. He loved dairy cattle, and his knowledge of them put him in the highest class of experts. The *Breeder's Gazette* says of him, "he was the best known and best liked judge of dairy cattle in America."

Dr. Scovell was also active for many years in the Association of Official Agricultural Chemists, in the development and improvement of methods of agricultural analysis. He was president of that association in 1909. He was for several years a member of the committee on food standards, which worked in cooperation with this Department after the passage of the Food and Drugs Act of 1906. He was a member of various learned societies, especially those relating to agriculture and to chemistry, and was a fellow of the American Association for the Advancement of Science.

Dr. Scovell's personal qualities deserve especially to be mentioned. Gentleness, kindness of heart, patience amounting almost to a fault, and a tolerance and sympathy which were never failing, were attributes which he embodied in remarkable degree. As his associates have well said, "in the highest and best sense he was the good citizen and the pioneer in the spread of a higher civilization and nobler ways of living." These high attributes of character, coupled with his unbounded good humor and cordiality, made him hosts of friends to whom he was joined by strong bonds of friendship.

The affection and esteem in which he was held in his home city is attested by the unusual action of the street railway company in ordering that at the hour of his funeral services every car should stop for three minutes, and of the mayor of Lexington in requesting that every wheel, on pleasure or business bent, should pay him the same mark of respect.

Truly, as President Barker of the university has said, "the world is richer because he has lived and poorer because he is dead."

## RECENT WORK IN AGRICULTURAL SCIENCE.

### AGRICULTURAL CHEMISTRY—AGROTECHNY.

Physical chemistry and agriculture, C. ULPANI (*Atti Soc. Ital. Prog. Sci. [Naples]*, 4 (1910), pp. 317-351, figs. 4; *abs. in Chem. Ztg.*, 35 (1911), No. 103, *Repert.*, p. 430).—The importance of the phase rule, electrolytic dissociation, colloidal condition, etc., for explaining some of the phenomena which occur in the soil, as well as the action of certain fertilizers, is pointed out.

Agricultural chemistry, F. KLINCKFUES (*Monatsh. Landw.*, 4 (1911), No. 10, pp. 293-299).—This is a discussion of some of the newer findings in the field of agricultural chemistry.

Phytin and phosphoric acid esters of inosit, R. J. ANDERSON (*New York State Sta. Tech. Bul.* 19, pp. 3-16; *Jour. Biol. Chem.*, 11 (1912), No. 5, pp. 471-488).—Attempts to synthesize phytic acid and the hexaphosphoric-acid ester of inosit resulted negatively. The compound obtained with the Contardi method, or with a modification thereof, was the tetraphosphoric ester of inosit. It made very little difference whether the phosphoric acid was present in a small or large excess (above 6 molecules of phosphoric acid to 1 molecule of inosit), the same compound being produced. When present in a lesser amount than 6 molecules of acid to 1 of inosit a mixture of esters was obtained. The tetraphosphoric-acid ester of inosit, which is a new compound, could be easily isolated by means of its barium salt, and is very similar in appearance and in its behavior with reagents to phytic acid. When decomposed by heating with an acid, phosphoric acid and inosit were regenerated. The inosit used in the esterifications was prepared from a crude magnesium compound, which is mentioned below. Inosit was not so easily obtained as one is led to believe by the work of Starkenstein.

Several salts, tribarium phytate,  $C_8H_{12}O_8[(PO_3H)_2Ba]_3$ , pentabarium phytate,  $C_8H_{12}O_8P_5Ba_5$ , pentabarium ammonium phytate,  $C_8H_{12}O_8P_5Ba_5(NH_4)_5$ , pentamagnesium ammonium phytate,  $C_8H_{12}O_8P_5Mg_5(NH_4)_5$ , and tetracupric dicalcium phytate,  $C_8H_{12}O_8P_4Cu_4Ca_2$ , were prepared in some instances "from commercial phytin and from an organic-phosphorus magnesium compound by precipitating with barium chlorid and barium hydroxid; others were prepared from previously purified phytic acid." Those obtained from neutral or alkaline solutions have a general formula— $C_8H_{12}O_8P_nM_n$ . "The barium salt of phytic acid, obtained from very dilute hydrochloric acid or 10 per cent phytic acid solutions corresponds to the general formula— $C_8H_{12}O_8P_5M_5$ ." The constitution of phytin therefore still remains unsolved.

Method for preparing tyrosin and glutaminic acid, and their quantitative determination, E. AEDERHALDEN (*Hoppe-Seyler's Ztschr. Physiol. Chem.*, 77 (1912), No. 1, pp. 75, 76).—A quantitative method is described for preparing tyrosin and glutaminic acid, which allows the use of the mother liquors for isolating other amino acids which may be contained in them, as follows: The protein, i. e., waste silk, etc., is hydrolyzed by boiling for 6 hours with 3 times its bulk of fuming hydrochloric acid (specific gravity 1.19). The hydrolysate

is then evaporated repeatedly under diminished pressure to remove most of the hydrochloric acid, and the residue taken up with water. Ammonia gas is then passed through the solution until saturation has taken place, or if no ammonia bomb is at hand the residue is dissolved in an excess with ammonium hydroxid solution in water. The solution is then again evaporated to dryness, and if silk waste was employed the solution is extracted with cold water. Tyrosin remains in the residue. A still better way is to boil the residue with water containing some animal charcoal, the tyrosin being allowed to crystallize out from the extract. The mother liquors obtained are then evaporated to dryness and esterified in the usual manner. The undissolved ammonium chlorid may be filtered off, while the remainder of the process is the usual one.

For preparing the glutaminic acid ammonia gas is passed through the aqueous solutions and these evaporated to dryness. The residue is then recrystallized from hot water. The greater portion of the glutaminic acid can be obtained by fractional crystallization, and the remainder from the mother liquors by precipitation with alcohol.

The identity of the guanin pentosid prepared from molasses with reference to vernin, E. SCHULZE and G. TRIER (*Hoppe-Seyler's Ztschr. Physiol. Chem.*, 76 (1912), No. 2-3, pp. 145-147; *abs. in Zentbl. Biochem. u. Biophys.*, 12 (1912), No. 23, p. 901; *Zentbl. Physiol.*, 26 (1912), No. 1, p. 9).—The guanin pentosid obtained by ANDRÁK (E. S. R., 26, p. 116) from molasses residues is thought to be identical with the compound known as vernin. The authors believe that guanin-*d*-ribose is the only guanin pentosid occurring in nature.

The complete extraction of alcohol and water-soluble phosphorus compounds from plants, H. ULRICH (*Arch. Expt. Path. u. Pharmacol.*, 68 (1912), No. 3, pp. 171-185).—The 3 principal groups of phosphatids can be extracted by treating the dried plant tissue, etc., 24 hours with absolute alcohol, being careful to exclude all extraneous moisture during the process. This is followed by extracting the material with dilute nitric acid (0.5 per cent) for about 20 successive times at room temperature. The work was done with oats and wheat bran.

The mode of action of phosphatase, I, H. EULER and S. KULLBERG (*Hoppe-Seyler's Ztschr. Physiol. Chem.*, 74 (1911), No. 1, pp. 15-23).—The enzym phosphatase (the authors propose using the termination "ese" for synthesizing enzymes), in the presence of phosphates during the fermentation of sucrose with yeast juice or with extract of dried yeast will bring about the formation of carbohydrate-phosphoric acid esters. The authors now find that this enzym is much more readily absorbed by kaolin than was invertase from a neutral solution, and is much more quickly destroyed by precipitating with alcohol. Phosphatase shows its greatest activity in alkaline solutions, and at 30° C. its activity is one and three-fourths times greater than at 20°, but it is much less resistant to heat than invertase. It was also noted that unaltered dextrose does not react, or only very slowly reacts with the phosphate.

An ester obtained by treating a partially fermented solution of dextrose or levulose with a phosphate was optically inactive, nor was an optically active product obtained when the ester was decomposed with an acid or alkali. The ester is in all probability produced from a substance which is formed and decomposed again during the action of yeast on dextrose. This holds good for levulose and sucrose also. *Aspergillus niger* (when cultivated in sucrose and yeast water) and ripe oats contain phosphatase. Two enzymes are apparently concerned in the above process, one which converts the sugar into an ester-forming carbohydrate, and another which synthesizes the ester from the phosphate and carbohydrate ions.

In regard to the action of phosphatase, H. EULER and S. KULLBERG (*Hoppe-Seyler's Ztschr. Physiol. Chem.*, 76 (1912), No. 2-3, p. 241; abs. in *Zentralbl. Expt. Med.*, 1 (1912), No. 4, p. 153).—The difference in results obtained by von Lebedew and the authors can be attributed to the kind of yeast preparation employed.

Regulatory formation of the enzym tannase, L. KNUDSON (*Abstr. in Science*, n. ser., 34 (1911), No. 868, pp. 219, 220).—*Aspergillus niger* was grown in 14 media, each of which contained a different carbon compound. The results show that tannase formation takes place when the sugar in the medium is displaced by tannic or gallic acid, or supplemented by tannic acid. Gallic acid was found not to be as efficient as tannic acid as a source of carbon for stimulating the formation of the enzym.

As no work has been reported on the effect of concentration of the transformable substance on the quantity of the corresponding enzym produced, the author made tests with *A. niger* and *Penicillium* sp., "in which a modified Czapek's solution was the nutrient medium—in this the concentration of sugar was made 10 per cent, and it was supplemented by tannic acid in concentrations varying from 0.01 to 10 per cent. The quantity of the enzym produced was augmented by increase in concentration of the tannic acid. None, however, was formed when the concentration of tannic acid was as low as 0.01 per cent.

"Similar results were obtained with *Penicillium* sp., *A. camidus*, *A. oryza*, and *P. granulatum* cultivated in a synthetic solution in which the carbon was supplied as 5 per cent cane sugar and supplemented by 2 per cent tannic acid also developed in the enzym tannase. *P. expansum* in a similar solution did not develop the enzym."

Separation of peroxidase from catalase, A. KASANSKI (*Biochem. Ztschr.*, 39 (1912), No. 1-2, pp. 64-72).—This is a study of a method for obtaining preparations which will give the peroxidase reaction but not the catalase test. It is accomplished by adding pyrogallol to the material under examination. Hemp, sunflower, and barley seedlings, liver, radishes, horseradish, and yeast were studied.

Action of emulsin upon salicin in an alcoholic medium, E. BOURQUELOT and M. BRIDEL (*Compt. Rend. Acad. Sci. [Paris]*, 154 (1912), No. 15, pp. 944-946).—The results show that the action of emulsin upon salicin is not arrested in solutions containing strong concentrations of alcohol.

The calcium carbide method for determining moisture, H. C. McNEIL (*U. S. Dept. Agr., Bur. Chem. Circ.* 97, pp. 8, fig. 1).—This is a description of a method for determining moisture in paints, soaps, and miscellaneous materials by the calcium carbide method (*E. S. R.*, 27, p. 312). Calcium carbide is added directly to a known weight of the sample, the amount of acetylene generated during the process measured, and the amount of acetylene found is then referred back to moisture.

The apparatus employed in the method is illustrated and consists of a generating flask of about 20 cc. capacity for holding a known weight of the material to be examined, and which has a carbide tube with a projection on one side for holding 5 cc. or more of a finely powdered carbide. The flask is attached to a 100 cc. jacketed burette, drawn out at the ends to facilitate connections. The jacket is connected with a tap for the purpose of cooling with water and to obtain an accurate control of the temperature. In addition there is a leveling vessel. The liquid used in the gas burette and leveling vessel is either mercury or a concentrated solution of sodium chloride, which has stood in contact with acetylene until saturation has taken place. The latter solution is tinted with phenolphthalein and a little sodium hydroxide to facilitate reading.

The behavior of this method with soaps, paint materials, infant foods, leather powders, vanilla beans, lubricating oil, and flour is described in detail.

**The Kjeldahl method.** M. SIEGFRIED and O. WEIDENHAUPT (*Hoppe-Seyler's Ztschr. Physiol. Chem.*, 76 (1912), No. 2-3, pp. 238-240; *abs. in Zentbl. Expt. Med.*, 1 (1912), No. 6, p. 242).—Boiling should not be resorted to after potassium permanganate has been added to the solution. The author takes the flask from the burner or turns the burner out, adds permanganate, heats, and then adds permanganate again for a period of 3 minutes until the pink color remains permanently.

A practical method for reducing potassium platonic chlorid when determining potash as potassium platonic chlorid, A. FIECHTER (*Ztschr. Analyt. Chem.*, 50 (1911), No. 10, pp. 629-632).—The process consists of adding some magnesium filings or chips in dilute hydrochloric acid to the potassium platonic chlorid, which has been previously washed with alcohol and dissolved in a little hot water. The process is completed in a few minutes if the mixture is heated on a wire gauze. Some comparative tests between the method and Neubauer's show a difference of only from 0.1 to 0.2 per cent.

The determination of potassium as potassium platonic chlorid, B. TENKA (*Ztschr. Analyt. Chem.*, 51 (1912), No. 2, p. 103).—A discussion in regard to priority of the method described by Fiechter above.

In regard to iron metabolism.—I. Method for the quantitative determination of small amounts of iron, F. JAHN (*Hoppe-Seyler's Ztschr. Physiol. Chem.*, 75 (1911), No. 4, pp. 308-338; *abs. in Zentbl. Biochem. u. Biophys.*, 12 (1912), No. 21-22, p. 863).—For determining iron in organic substances, especially in small amounts, the author utilizes the Knecht and Hibbert method, which rests on the following equation:  $\text{FeCl}_3 + \text{TiCl}_3 = \text{TiCl}_4 + \text{FeCl}_2$ . The method gives results which differentiate amounts of 0.1 mg. of iron very definitely and allows the titration to be done in 15 minutes.

The substances required in the test are concentrated sulphuric acid and nitric acid of known iron content for ashing according to the Neumann method, a solution of potassium sulphocyanate, approximately 40 per cent strength, a 1/250-normal to 1/500-normal titanous trichlorid solution, which is preserved by pouring paraffin oil upon it, a ferric sulphate solution containing 1 mg. of iron per liter, and air-free water.

A modification of Marsh's apparatus for the detection of arsenic, L. COHEN (*Dept. Agr. N. S. Wales, Sci. Bul.* 4, 1911, pp. 5, fig. 1).—The following modification of Marsh's apparatus, as used by the author, is described:

"Impure hydrogen, generated from dilute sulphuric acid and ordinary granulated commercial zinc, is purified by passing through a neutral aqueous solution of silver nitrate, which combines with the  $\text{AsH}_3$  with reduction to metallic silver. It then passes through a mixture of the suspected liquid with dilute sulphuric acid, in contact with a small quantity of pure arsenic-free zinc, or a bundle of magnesium wire (in which latter case the solution must contain only very little free acid, so as to avoid much heating), and carries over the small quantity of hydrogen thus produced, with the  $\text{AsH}_3$  resulting from the reduction of any arsenic present in the suspected matter. The combined gases, after trying, are tested in the usual way."

The chemical composition of the clay obtained in the Schloesing-Grandeau method, E. BLANCK (*Jour. Landw.*, 60 (1912), No. 1, pp. 75-81).—The results of examining the clays elutriated by the Schloesing-Grandeau method from 7 Silesian soils, taken chiefly in the vicinity of Breslau, Germany, are given. The conclusion is reached that the chemical composition of the clay varies markedly, but within certain limits, and furthermore that the chemical compo-



sition of these clays bears no relation to the chemical composition of kaolin, because much of it consists of quartz particles. The claim made for the uniformity of these products obtained by this method is, therefore, not justified.

In regard to a precipitin with which it is possible to differentiate boiled insoluble protein, W. A. SCHMIDT (*Ztschr. Immunitätsf. u. Expl. Ther.*, I, Orig., 13 (1912), No. 2, pp. 166-185).—Blood serum heated for 30 minutes at a temperature of 70° C., then treated with dilute sodium hydrate, and heated for 15 to 20 minutes more in order to make it nonreacting to either native or heat precipitin, when injected into an animal will yield a serum which contains a heat-alkaline-protein precipitin. This serum will react with a serum which has been boiled for 3 hours and dissolved in a decinormal sodium hydrate solution. The serum is a positive test for differentiating insoluble proteins.

In regard to the utility of the ester method for detecting monoamino acids when polypeptids are present, E. ABDEHILDEN and R. HANSLIAN (*Hoppe-Seyler's Ztschr. Physiol. Chem.*, 77 (1912), No. 4, pp. 285-283).—The method is deemed perfectly reliable for this purpose, providing the necessary precautions are taken.

A comparative study of some analytic methods for determining phosphorus in vegetable products, A. PONTE (*Staz. Sper. Agr. Ital.*, 44 (1911), No. 5-6, pp. 459-461).—Comparing the results obtained for phosphorus when incinerating by the ordinary ashing and the electrical methods (E. S. R., 20, p. 207), it is noted that the former has losses which vary between 2 and 11 per cent. The methods which incinerate in the presence of calcium oxid yield figures about similar to those obtained with the electrical method.

The ash of vinegar, R. E. REMINGTON (*North Dakota Sta. Spec. Bul.*, 2 (1912), No. 5, pp. 92-94).—In determining the phosphoric acid content of vinegar considerable difficulty was always experienced in obtaining duplicate results for the soluble and insoluble portion, although concordant results for total phosphoric acid were practically always obtained. In order to determine if the method of ashing used was accountable for these variations, 3 samples of cider vinegar were ashed in platinum dishes over Bunsen burners, which in each case were adjusted to give various degrees of heat. Some of the samples were finished with a blast lamp.

"While the temperature seems to exert little or no influence upon the total amount of phosphoric acid recovered, in all cases the soluble portion increases with increasing temperature. Expecting that higher temperature would favor the formation of more or less insoluble pyrophosphates, the results obtained are surprising. The alkalinity of the soluble ash increases with the temperature so long as it does not rise above the fusing point of the ash. But when the blast lamp was used, a decrease in alkalinity was noted, due to the loss of potassium salts by volatilization. That this is so was shown by ashing duplicate portions of vinegar, in one case blasting only long enough to obtain complete fusion, in the other for 30 minutes. . . . If the ash data are to continue of value in the interpretation of vinegar analysis, the ashing must be done under more carefully specified conditions than heretofore—say in an electric muffle, with accurate temperature control and for a definite time. Otherwise no two chemists can expect to obtain concordant results."

The Fiehe reaction for the examination of honey, L. STÖCKLIN (*Ann. Falsif.*, 5 (1912), No. 41, pp. 116-121).—This is a discussion of the reasons for some of the failures obtained with the Fiehe reaction, and a description of a procedure which will give better results.

The occurrence of boric acid in honey, G. BÜTTNER (*Ztschr. Untersuch. Nahr. u. Genussmit.*, 23 (1912), No. 4, pp. 139, 140).—Pure honey often contains boric acid.

Detection of nitric acid in watered fruit juices, R. COHN (*Ztschr. Öffentl. Chem.*, 17 (1911), No. 19, pp. 361-363; *abs. in Analyst*, 37 (1912), No. 430, p. 21).—The method is as follows: Make 75 cc. of the juice alkaline with sodium hydroxid, evaporate nearly to dryness, and extract the residue with alcohol at a temperature of 40° C. The extraction is conducted for several minutes. If the residue from the alcohol extract still has a sirupy appearance it must be re-extracted with alcohol, and then taken up with 10 cc. of water and tested with diphenylamin for nitric acid. No positive reaction was ever obtained with authentic raspberry, currant, or cherry juices. Bilberry juice was found to give a blue coloration with sulphuric acid alone, and therefore can not be tested by this method. Nitron can be employed for this purpose.

Methods for sugar analysis and allied determinations, A. GIVEN (*Philadelphia*, 1912, pp. 75, figs. 8).—This is a description of methods for examining sugar and sugar products. The official methods are included and some apparatus used in the Bureau of Chemistry of this Department is pictured.

Examination of lactose and the by-products of lactose manufacture, A. BURR and F. M. BERBERICH (*Chem. Ztg.*, 35 (1911), Nos. 82, pp. 751, 752; 86, pp. 794-796; 87, pp. 803, 804).—Previously noted from another source (E. S. R., 23, p. 313).

The chemical and bacteriological methods for examining milk, G. RÜHM (*Ztschr. Fleisch u. Milchhyg.*, 22 (1912), No. 5, pp. 142-148).—This continuation of work previously noted (E. S. R., 25, p. 207) deals entirely with bacteriological methods. It includes some special methods for detecting and differentiating the organisms involved in mastitis, pyogenic infections, and actinomycosis.

What is the best test for judging the quality of milk? J. STAPENSÉE (*Tijdschr. Veeartsenijk.*, 39 (1912), No. 6, pp. 231-260).—This is a study of the various methods proposed for examining milk from the hygienic point of view.

The catalase test is given first place for detecting milks which contain secretions from animals affected with mastitis. If a milk yields a volume of gas of 2 cc. or more within 3 hours, at a temperature of 37° C.±, the sample should be tested by the Trommsdorff leucocyte method and its chlorin content determined. When necessary other tests, such as Schardinger's reaction and the diastase test, may be employed in addition. The relation of the bacterial content of the milk to these reactions is also considered.

Methods for determining iron in milk, F. E. NOTTROHM and W. WEISSWANG (*Ztschr. Untersuch. Nahr. u. Genussmit.*, 23 (1912), No. 10, pp. 514-523).—This work, which was done in part with synthetic ash solutions, confirms the findings of others that the iron content of milk can not be determined in a hydrochloric solution of the milk ash by the colorimetric method.

On the basis of the results obtained the authors recommend the following method for determining the iron content of milk: One hundred cc. of milk is dried in 2 platinum dishes on the water bath, heated to from 150 to 180° C., and ashed in a quartz muffle. The process is then completed over a microburner. In order to remove the last traces of carbon the ash is rubbed up with water, dried, and ashed again. The white ash is now mixed with iron-free hydrochloric acid and evaporated to dryness, and this process is repeated. The ash is then taken up with 40 cc. of  $\frac{1}{2}$ -normal hydrochloric acid solution, transferred to an Erlenmeyer flask and oxidized by the addition of a few drops of nitric acid.

After cooling the ash solution it is transferred to a separatory funnel, 2 cc. of a 5 per cent solution of "cupferron" added, mixed well, and allowed to stand for  $\frac{1}{2}$  hour. The solution is shaken out twice with 25 cc. of chloroform, the chloroform extracts are transferred to a 100 cc. Erlenmeyer-Jena flask, and the chloroform distilled off on a water bath, care being taken to distill off the last

traces of chloroform. The residue is ashed by carefully heating the flask over a free flame. The iron oxid obtained is dissolved in hydrochloric acid and determined colorimetrically with potassium sulphocyanate.

The iron content of cow's milk, F. EDELSTEIN and F. VON OSONKA (*Biochem. Ztschr.*, 38 (1912), No. 1-2, pp. 14-22).—Cow's milk collected in glass vessels was found to contain from 0.4 to 0.7 mg. of iron per liter, with an average of 0.5 mg. In ordinary mixed dairy or market milk the amount was somewhat higher, varying from 0.7 to 0.15 mg. The amount of iron in milk depends very much on the methods of handling it in the dairy and subsequently, and this may explain the great discrepancies in regard to the iron content of milk noted in the literature. Woman's milk contains about one-third to one-fourth more iron.

The Neumann iodometric method and the Lachs-Friedenthal method (E. S. R., 26, p. 314) were employed in this work. Certain disadvantages of the latter method are pointed out.

Notes on the analysis of margarin, C. H. CEIBE and P. A. E. RICHARDS (*Analyst*, 36 (1911), No. 424, pp. 327-333).—The simple Reichert-Wollny refractometer test, according to these authors, is no longer effective for determining whether margarin comes up to the legal standard, particularly where coconut oil and butter are present. A combination of the Wollny process and the Polenske method is suggested for the examination of butter, margarin, etc.

The authors propose a correction of the volatile fatty acids to include those due to coconut oil and for the solubility of so-called insoluble fatty acids. Experiments are reported with mixtures of coconut oil, butter fat, and margarin fat to illustrate some of the contentions noted above.

Time required to sterilize canned goods at different temperatures, H. SEBBER (*Konserv. Ztg.*, 13 (1912), No. 12, pp. 89, 90; *Pure Products*, 8 (1912), No. 5, pp. 257-260).—From figures obtained in experimental tests the author proposes to subtract 60 minutes from the time required to sterilize the material in an open water bath and to divide the remainder by 3, the result obtained approximating the actual time required in heating in a retort. Conversely, the time actually required in a retort may be multiplied by 3 and 60 minutes added to obtain the time required in an open water bath. Carrots and snap beans were computed to need 16.6 and 20 minutes, respectively, in a retort, and Brussels sprouts, asparagus, and peas 183, 87, and 108 minutes in an open water bath.

"These figures are naturally not strictly exact, but are approximately correct, and will be the maximum times required, since we are considering the case of *Bacillus subtilis*, which is the most resistant of bacteria. Those who contemplate changing from the open water baths to retorts, or vice versa, will find this method of calculation of use."

The preparation of berry and other fruit wines, P. ARAUNER (*Noturw. Wchenschr.*, 27 (1912), No. 19, pp. 301, 302).—The preparation of apple, gooseberry, strawberry, blackberry, currant, raspberry, blueberry, pear, cherry, and plum wine with pure culture yeast is described.

The milling of cane considered in relation to the volume occupied by the fiber, N. DEEBE (*Hawaiian Sugar Planters' Sta., Agr. and Chem. Bul.* 38, pp. 61, figs. 24).—According to the author, no experiments are on record which show how cane fiber behaves under pressure. It was thought that if this topic were studied some data might be obtained in regard to the weight of the juice expressed and the volume of the fiber corresponding to a definite pressure.

"The amount of juice expressed from chopped cane subjected to a direct pressure increases with the degree of fineness of the material. After chopped cane has been pressed to a certain pressure a further notable quantity of juice can be obtained by releasing the residue from pressure and pressing again. The pressure at which juice begins to flow from bagasse is not a measure of the

pressure at which it has been pressed. With the pressure remaining constant greater percentages of juice are obtained from chopped cane as the quantity of material under pressure decreases. . . . At pressures up to 60 lbs. per square inch the volume of bagasse varies inversely as the 2.5th root of the pressure."

The work shows that "the pressure exerted by the bagasse in its passage between the top and front roller is very much less—probably about one-fortieth—than that exerted in its passage between the top and back roller, that is to say, the strains in the conventional 3-roller mill are symmetrical and as much metal is used in the feed side and in the front roller as in the delivery side and in the back roller. The logical application of the experiments described here would indicate that the front roller be regarded solely as a feed roller and would point to a 2-roller mill with a small feed roller as being the rational design for the later mills of a train.

"In a 2-roller mill, however, the pressure exerted by the layer of bagasse will not be in a vertical line but . . . will pass through a point 0.81 in. from the line of nearest approach of the rollers; in a mill with rollers superimposed vertically there will then be a small side thrust, due to the slow recovery of bagasse after compression."

Stohmann's handbook of sugar manufacture, revised by A. SCHANDER (*Stohmann's Handbuch der Zuckerfabrikation. Berlin, 1912, 5. ed. rev., pp. XVIII+810, pl. 1, figs. 384*).—A fifth edition of this well known work.

Centenary of the manufacture of beet sugar, 1812–1912, L. LANDT (*Bul. Assoc. Chim. Sucr. et Distill., 29 (1912), No. 9, pp. 600–619*).—This is a detailed historical discussion of the numerous events which occurred in the beet-sugar refining industry during the years 1812–1912.

Thirty-fourth report of the Swiss Agricultural-Chemical Institute at Zurich, 1911 (*Landw. Jahrb. Schweiz, 26 (1912), No. 3, pp. 167–182*).—This report contains analyses of fertilizers, feed stuffs, agricultural products, and miscellaneous substances.

## METEOROLOGY—WATER.

Weather and agriculture, A. SCHMAUSS (*Landw. Hefte, 1912, No. 7, pp. 36, figs. 7*).—The farmer as a weather observer and prognosticator, the signs and methods he makes use of, and means of improving his methods by use of the weather maps and application of scientific principles, are discussed. Predictions based on phases of the moon as well as on the 100-year calendar of Mauritius Knauer and many popular rules are shown to be of no value. Lists of books suitable for the German farmer's use and of weather service stations in Germany are given.

Monthly Weather Review (*Mo. Weather Rev., 40 (1912), Nos. 3, pp. 321–486, pls. 10; 4, pp. 487–658, pls. 10, figs. 3*).—In addition to the usual climatological summaries, lake levels, weather forecasts and warnings for March and April, 1912, notes on the application of upper-air observations to weather forecasting, March and April, 1912, river and flood observations, lists of additions to the Weather Bureau library and of recent papers bearing on meteorology, a condensed climatological summary, and climatological tables and charts, these numbers contain the following special papers:

No. 3.—Some Effects of Air Drainage in River Valleys, by J. R. Weeks; The Brevoort Bluff Tornado of February 21, 1912, by J. H. Kimball; The Floods of March, 1912, in the South Atlantic and East Gulf States, by C. F. von Herrmann; Ice Storm in Illinois, by C. J. Root; Abnormal Snowfall at Springfield, Mo., by J. S. Hazen; Temperatures Injurious to Peaches, Apples, and Pears in Various Stages of Development (see page 439); Depth of Snow in the

Mountains of Utah at the Close of March, 1912, by A. H. Thiessen; Report of Snow Measurements in Maple Creek Watershed, Utah County, Utah, March 4 to March 14, 1912, by A. H. Thiessen; Notes on the Rivers of the Sacramento and San Joaquin Watersheds during March, 1912, by N. R. Taylor; Notes on the Streams of the Upper San Joaquin Watershed, by W. E. Bonnett; Weather Conditions at Los Angeles, Cal., by A. B. Wollaber; and The Severe Cold of December 25-26, 1911, in the Citrus Districts of Southern California, and Methods Adopted for Fruit Protection, by A. B. Wollaber.

No. 4.—Destructive [Wind] Storm of April 2, 1912; The Floods of April, 1912, in the Gulf States; Floods in Michigan, Spring of 1912, by C. F. Schneider; Tornadoic Storms in Illinois, by C. J. Root; Tornado at Murphysboro and Bush, Ill., April 21, 1912, by F. H. Colyer; Tornado Near Carbondale, Ill., by F. H. Colyer; City and Suburban Temperatures, by E. D. Coberly; Does Frost Fighting Pay in Utah? by J. C. Alter; Why the Snow Slides from the Mountain Slopes, by J. C. Alter; Measurement of Snow in Big Cottonwood Canyon, Utah (illus.), by S. Q. Cannon; Notes on the Rivers of the Sacramento and San Joaquin Valleys for April, 1912, by N. R. Taylor; Notes on the Streams of the Upper San Joaquin Watershed, by W. E. Bonnett; New Heater and Vaporizer for Frost Protection, by A. G. McAulie (see page 439); Lower Powder Valley Project, Baker County, Oreg., by J. H. Lewis; Reorganization of Government Meteorological Work in Chile; and A Peculiar Stroke of Lightning (illus.), by N. N. Mason.

General weather review, 1910-11, W. M. ESTEN and C. J. MASON (*Connecticut Storrs Sta. Rpt. 1910-11, pp. 579-597, figs. 2*).—A record is given of observations on temperature and precipitation during each month of 1910 and 1911 at Storrs, the rainfall for 1910 and 1911, the monthly mean temperature and monthly precipitation for the 23 years, 1888 to 1910, and dates of the last and first killing frosts for the 24 years, 1888 to 1911. The mean temperature at Storrs during the 24 years has been 47.1° F., the highest 99°, and the lowest -14°. The mean annual rainfall has been 45.35 in., the longest growing season 184 days, and the shortest 131, the average date of the last killing frost in the spring, May 4, and of the first killing frost in the autumn October 8.

Meteorological observations (*Maine Sta. Bul. 197, pp. 329-331*).—Observations at Orono, Me., on temperature, precipitation, cloudiness, and wind during 1911 are compared with the means of similar observations for 43 years. The mean temperature for 1911 was 43.62° F., the mean for 43 years 42.39°; the precipitation for 1911 was 36.06 in., for 43 years 43.30 in.; the snowfall for 1911, 76.25 in., for 43 years 91.11 in.; the number of clear days in 1911 was 113, cloudy days 133; total movement of wind in miles, 54,528. A table is also given which shows the monthly and annual precipitation during 1911 at 18 different places in Maine.

Report of the meteorologist, F. STOKTON (*New Mexico Sta. Rpt. 1911, pp. 50-55*).—Summaries of observations at the station from 1905 to 1911 on temperature, precipitation, and dates of first and last killing frosts, and from 1906 to 1911 on storms and wind movement are given.

[Meteorology of Finland] (*Fennia; Bul. Soc. Géogr. Finlande, 50 (1911), pts. 1, Cartes 16-19, pp. 62, figs. 3; 3, Cartes 16-19*).—The meteorological and climatological conditions of Finland are shown in a series of charts which are briefly discussed. A bibliography of the more important literature on the subject is given.

"Red rain" dust, T. STEEL (*Chem. News, 105 (1912), No. 2742, p. 282*).—An analysis of dust which fell in Sidney October 11, 1909, is reported, indicating the material to be mainly sand and clay with 0.22 per cent phosphoric acid

and 0.17 per cent nitrogen. Potash was not determined. Other papers on the subject are reviewed.

**Predicting water supply for the farmer.** J. C. ALTER (*Sci. Amer. Sup.*, 73 (1912), No. 1904, pp. 413, 414, figs. 5).—A brief account is given of a snow survey of the Maple Creek watershed near Springfield, Utah, by the Weather Bureau of this Department.

"The actual work of the snow survey consisted in going up the bottom of each gulch or canyon and back and forth along the slopes, measuring the snow depth and density every thousand feet or so, depending upon the variability of the snow deposit, the general topography, and the brush or forest cover, and mapping the snow area on a field map. . . .

"Stream flow measurements at a weir, located some distance above the highest farm land, have been made daily since the completion of the survey, and will be continued throughout this year (1912) and probably indefinitely in the future. Rain and snowfall observations have also been made from a precipitation gage located near the weir, and are to be continued indefinitely.

"The first year's records of run-off, following the survey, are not directly comparable with the amount of water in the form of snow, shown by the survey, even when corrected for precipitation gain, and evaporation loss, as there is a seepage loss in this particular canyon, the amount of which can not be determined from one year's observations."

#### SOILS—FERTILIZERS.

**Investigations on soils from crystalline rocks in process of weathering.** K. BUCH (*Untersuchungen über Verwitterungsböden kristallinischer Gesteine. Inaug. Diss., Univ. Halle, 1911*, pp. 67; *Kühn Arch.*, 1 (1911), pt. 2, pp. 357-389, fig. 1; *abs. in Zentbl. Agr. Chem.*, 41 (1912), No. 3, pp. 145-147).—It is pointed out that previous investigations on soil particles, such as those by Ramann, Keilhack, Meyer, Sachse, Borzuchowski, and Puchner, have had to do with soil material of a heterogeneous character. In his work, therefore, the author used soils derived from known sources, that is, those formed in place from diabase, granite, and basalt rocks. With them he studied (1) the relation between the mechanical composition as determined by Hilgard's elutriator method and the hygroscopicity of the soil by the Mitscherlich method (*E. S. R.*, 24, p. 419), and (2) the proportion of plant-food constituents contained in the different sized groups of soil particles. The surface soil derived from the diabase rock was a porous, fertile loam with a very porous, slightly sandy subsoil. The granite soil was a shallow, sandy loam with a rocky subsoil, and the basalt soil was a deep, heavy loam.

It was found that the individual soil particles of the different groups as separated out by sedimentation were not of the same size. This the author attributes to a difference in the surface area of the particles and a consequent variation in the resistance to the current of water. The variation in results of repeated mechanical analyses of the same soil is attributed to errors in sampling. Contrary to the conclusions of Mitscherlich, the hygroscopicity of these soils was not found to be proportional to the outer surface area. This may be explained by the fact that the larger soil particles contained hygroscopic water in the weathered cracks and crevices. Soils of the same mechanical composition differed in their hygroscopicity, this difference being determined by the mineral composition and the stage of weathering of the soil.

A relation between the size of the soil particles and the plant-food constituents was determined only for the iron and the calcium and magnesium carbonates. The iron was associated mostly with the finest particles. The dis-

tribution of the calcium and magnesium carbonates in these soils was similar to that in soils derived from marls, that is, the percentage of these constituents was higher for the finer particles and decreased in the sand components of the soil. There was no relation between the total lime, magnesia, phosphoric acid, potash, and nitrogen contents and the size of the soil particles. The amount of these constituents in the individual groups of soil particles was found to be dependent entirely upon the mineral composition of the soil particles which go to make up the individual group.

It was also found that the solubility of phosphoric acid, calcium, and magnesium of the diabase subsoil in hydrochloric acid was greater than that of the surface soil. This was thought to be due to the more advanced weathering of the subsoil.

Gray sand and hardpan (Ortstein), WILHELM GRAF ZU LEININGEN (*Abhandl. Naturhist. Gesell. Nürnberg*, 19 (1911), No. 1, pp. V+45, fig. 1; *abs. in Internat. Mitt. Bodenk.*, 1 (1912), No. 6, pp. 584, 585).—This report contains a review of the literature and an account of the author's own contributions to the subject. It is shown that hardness of hardpan is not dependent upon the iron compounds it contains but seems to be closely related to the moisture content of the soil. The aeration of the soil also seems to prevent the extreme hardening of the hardpan formation.

It is held that no one theory regarding the formation of hardpan has general application since the conditions of formation vary with the locality, especially with the kinds of vegetation and climatic conditions. Ortstein is rich in alumina and phosphoric acid and poor in lime, magnesia, and potash. Diluvial gray sand is, as a rule, poor in plant-food constituents. It may, however, be more fertile when the soil is formed in place. As a rule, the absorptive capacity of gray sand is low. Ortstein is not associated with any definite formation, although it generally occurs in fertile, loose sands and also on granites and buntersandstein. It is seldom formed in lime and gneiss soils. The age of ortstein has been determined in one case to be over 2,000 years.

Regarding brown soils, K. D. GLINKA (*Pochvovedenie (Pédologie)*, 13 (1911), No. 1, pp. 17-48; *abs. in Internat. Mitt. Bodenk.*, 1 (1912), No. 6, pp. 578-580).—The author reports a study of typical formations of the so-called brown soils of central Europe as compared with similar formations (podzol soils) in Russia. It is stated that these brown soils are in a less advanced state of "podzolization" (chemical leaching processes under the influence of the solvent action of humus acids) than those of Russia, which are not of a typical brown type.

A geological sketch showing the distribution of the brown soils in Europe and in Asia is included.

Unproductive black soils, S. D. CONNER and J. R. ABBOTT (*Indiana Sta. Bul.* 157, pp. 235-264, figs. 5).—It is stated that Indiana contains, principally in the northwestern counties, several hundred thousand acres of black or peat soils; which are more or less unproductive but capable of being made fertile and productive by drainage and fertilization. Cooperative experiments were, therefore, undertaken on this soil in different counties to test the value of various fertilizer materials and mixtures for its improvement. Chemical analyses of samples of the soil are also reported.

The results showed that these soils were more often deficient in potash than in any other element and that applications of potash gave decided profit. "Some black soils of Indiana are more or less acid. Where there is strong acidity some form of basic lime, such as pulverized limestone, should be applied. On acid soils phosphoric acid is almost always needed in addition to limestone."

Potash is usually a secondary need on such soils." All the soils were well supplied with organic matter and only in a few cases was nitrogen necessary.

The soils of Alabama and their adaptations to crops, J. F. DUGGAR (In *Alabama's New Era*, Montgomery: State Immigr. Dept. [1911], pp. 39-47, pl. 1).—This is a general description of the physiographic divisions of Alabama and their characteristic soils and crop adaptations.

"Taking the State of Alabama as a whole, it may be said that sandy soils cover a larger area than do either clay loams or clays and that the largest areas of clay soils are in the central prairie regions and in the Appalachian Valley and Piedmont Region, in the eastern part of the State. The greater part of the surface of Alabama is slightly rolling, but there are broken or mountainous areas as well as comparatively level land. The largest areas of nearly level land are (1) in the southern edge of the Coastal Plain, that is, in the quarter of the State nearest to the Gulf; (2) in the Central Prairie Region and adjacent narrow regions on each side of it; and (3) in the Tennessee Valley. By far the greater proportion of the cultivated land of Alabama is free from stones, but the presence of stones, especially in the Piedmont Region, in the region of gravelly hills, and elsewhere, does not decrease productiveness, though the stones interfere with the convenience of cultivation."

[Analyses of soils of the Burirhat Station Farm] (*Ann. Rpt. Agr. Stas. East Bengal and Assam*, 1911, pp. 25-28, pl. 1).—Chemical analyses of samples of soil from fertile and from barren areas on this farm showed very little difference in composition except that the calcium carbonate content in the samples of fertile soil was about twice that in the samples of barren soil. The ratio of magnesia to lime was high in both cases, being generally in the proportion of 3 or 4 to 1. Experiments to determine the effect of liming the soil for its improvement are now in progress.

Weeds in relation to soils, WINIFRED E. BRENCHEY (*Jour. Bd. Agr. [London]*, 19 (1912), No. 1, pp. 20-26).—These studies have been previously noted (*E. S. R.*, 27, p. 29).

The chemical characterization of soils, E. J. RUSSELL (*Chem. World*, 1 (1912), No. 1, pp. 5-8, figs. 3).—From a consideration of factors which influence the availability of plant-food constituents of the soil the author concludes "that for a complete account of the fertility relationships of soils a chemical examination alone is not likely to lead to any useful result." It is shown that soils of identical composition as determined by ordinary methods of soil analysis vary widely in productiveness as a result of difference in water conditions, suitability of the organic matter to support active bacterial life, and various other factors. Ordinary analysis must therefore be supplemented by various other inquiries before advice regarding improvement of a soil can safely be given.

More recent investigations in soil science, ALBERT (*Ztschr. Forst. u. Jagdw.*, 44 (1912), No. 4, pp. 240-249).—The author reviews the development of studies in colloid chemistry, pointing out particularly the application of this subject to the study of the soil. He is of the opinion that the colloid theory is often used to explain hitherto unsolved problems of physics and chemistry without exact knowledge of the scientific basis upon which it rests. There is need of a more careful and extended study of the subject.

A short bibliography is added.

Colloid chemistry studies on humus in limed and unlimed soils, W. THAYER (*Jour. Landw.*, 60 (1912), No. 1, pp. 1-18; *abs. in Chem. Abs.*, 6 (1912), No. 13, p. 1797).—This is an extract from a dissertation which has already been noted (*E. S. R.*, 25, p. 823). Preliminary studies of the chemical composition and



other properties of products obtained by extracting limed and unlimed compost with water, precipitating with alcohol, and dialyzing the products are reported.

The concentration of phosphoric acid in the soil in the neighborhood of old centers of population, F. HUGHES and A. ALADJEM (*Agr. Jour. Egypt*, 1 (1912), No. 2, pp. 81-83).—Analyses of soil samples from the "Kom" of Sakha showed a much higher phosphoric acid content than the soils of the Delta of Egypt as a whole. It is stated that this "Kom" marks the site of one of the oldest cities of the Delta, and that the accumulation of phosphoric acid is a "clear case of valuable plant food being drawn from a large area and becoming concentrated in the course of time over an area much smaller and more circumscribed."

The quantities of radium and thorium emanations contained in the air of certain soils, J. SATTERLY (*Proc. Cambridge Phil. Soc.*, 16 (1912), No. 6, pp. 514-533, figs. 5).—Measurements of radium and thorium emanations in the air of different soils to depths of 106 and 152 cm. showed at depths of from 100 to 150 cm. in gravelly soil about 2,000 times as much as there is usually in the atmospheric air.

The production and movement of nitric nitrogen in soils, R. STEWART and J. E. GREAVES (*Centbl. Bakt. [etc.]*, 2. Abt., 34 (1912), No. 4-7, pp. 115-147, fig. 1).—This article embodies the results of investigations previously reported in Bulletins 106 and 114 of the Utah Station (*E. S. R.*, 22, p. 617; 26, p. 616), as well as of later investigations by improved methods on a new series of plats on the same soil. These investigations dealt with the amount and distribution of nitric nitrogen in the soil to a depth of 10 ft. as affected more particularly by water conditions and crop.

The results obtained indicated a pronounced variation in nitric nitrogen content of the soil from foot to foot during the season due to movement by water, variation in nitrification, feeding of the plant, and fixation of nitric nitrogen in the form of insoluble protein by micro-organisms. The application of irrigation water had a distinct beneficial effect upon the formation of nitric nitrogen, being greatest where 15 in. of water was applied.

In cropped land there was always less nitrogen in the soil during the fall than in the spring. In fallow soil, on the other hand, more nitrogen was found in the fall than in the spring, but this surplus largely disappeared during the winter months.

The amount of nitric nitrogen in alfalfa and oat soils was low. In corn and potato soils it was high. Alfalfa was found to be a heavier feeder on soil nitrogen than potatoes notwithstanding the fact that the alfalfa was abundantly supplied with root tubercles. The concentration of the soil solution was very low in alfalfa and oat soils and high in fallow, potato, and corn soils. The concentration of the solution was always higher in fallow soil than in alfalfa, oat, and corn soil, and nearly always greater in unirrigated than in irrigated soil. It varied, however, quite widely not only with the crop grown and the amount of water applied but also at different depths in the soil. There was always a larger amount of nitric nitrogen in the fallow plats than in the cropped plats, but when the amount of nitrogen removed in the crop was taken into account it was found that more nitric nitrogen had always been formed in the cropped soil. The amount of nitric nitrogen was found to be more constant in the uncropped plats than in the cropped plats. The proportion of nitric nitrogen was found to be comparatively constant in the lower foot sections of the soil irrespective of the amount of water applied, up to 25 in., indicating that there was little leaching of the nitric nitrogen beyond the lower depths of sampling.

Nitrates in soils, F. L. STEVENS (*Science, n. ser.*, 35 (1912), No. 913, pp. 996-1000).—An abstract of this paper has already been noted (E. S. R., 26, p. 723).

The influence of molasses on nitrification in cane soils, S. S. PECK (*Hawaiian Sugar Planters' Sta., Agr. and Chem. Bul.* 39, pp. 5-25, charts 8).—In continuation of previous experiments on this subject with solutions and small quantities of soil (E. S. R., 24, p. 224), observations were made on 24 lysimeters, previously described (E. S. R., 25, p. 824), filled with surface soil from the station field.

Four lysimeters received no nitrogen and 4 each received sodium nitrate, ammonium sulphate, and high-grade tankage in amounts furnishing 100 lbs. of nitrogen per acre. Eight received the same amount of nitrogen in form of a mixture of equal parts of the 3 fertilizing materials named. One series of lysimeters was irrigated with water alone, one with water containing the equivalent of the ash content of 40 gal. of molasses per acre-foot of 3,000,000 lbs.; one series received molasses at the rate of 40 gal. per acre-foot before each irrigation; and one series received molasses at the rate of 400 gal. per acre-foot 1 week before the first irrigation. The molasses used contained nitrogen 0.27 per cent, lime 0.84, magnesia 0.99, potash 5.68, phosphoric acid 0.18, sulphuric acid 1.58, and chlorine 3.66 per cent. For the purpose of these experiments the ash was assumed to be composed of potassium chlorid 7.69, potassium sulphate 1.53, magnesium sulphate 1.32, and calcium phosphate 0.40 per cent.

A study of the drainage water from the lysimeters gave results confirming the conclusions from the previous experiments, indicating that "molasses applied to land which is receiving the usual fertilizer applications as practiced in [Hawaii] will work harm by causing a part of the nitrogen applied as nitrate to revert back to less available or unavailable forms of nitrogen; by checking the nitrification of sulphate of ammonia dressings, and by retarding the ammonification and nitrification of the nitrogen of organic fertilizers. The harmful effect of molasses dressings is due entirely to the organic constituents of the molasses, the mineral matters having no influence. Dressing with carbonate of calcium does not correct such adverse action of molasses."

Bacteriological studies of the fixation of nitrogen in certain Colorado soils, W. G. SACKETT (*Centbl. Bakt. [etc.]*, 2. Abt., 34 (1912), No. 4-7, pp. 81-115, figs. 5).—This is substantially a reprint in the German language of Bulletin 179 of the Colorado Experiment Station (E. S. R., 25, p. 815).

Regarding legume cultivation and inoculation experiments, A. EICHINGER (*Pflanzer*, 8 (1912), No. 4, pp. 190-219).—Experiments were made to determine the value under Amani (German East Africa) conditions of inoculating soils (with nitrobacterine) with and without fertilizers for the growth of *Desmodium tortuosum*, *Canavalia ensiformis*, soy beans, and cowpeas, and the value of these crops for green manuring purposes.

The best results were obtained by soaking the seeds before inoculating. The heavier classes of soil were not benefited by inoculation. Applications of superphosphate increased the number of nodules formed, whereas with sodium nitrate no nodules were formed.

The tests with different crops were for the most part inconclusive, and are being continued. The work with the soy bean, however, seemed to indicate that the production of this crop is not profitable for this region.

Regarding a new method of soil aeration in its scientific and practical aspects (*Deut. Landw. Presse*, 39 (1912), Nos. 41, pp. 483-485; 42, pp. 493-498).—This article is divided into three parts, as follows: (1) A description of the method and its development, by M. Friedersdorff; (2) observations on the effect on the soil of the above method of aeration, by P. Holdelheiss; and (3) a

theoretical discussion of the importance of soil aeration for bacteria and plant culture, by B. Heinze.

It is stated that, after several years' observations, the conclusion was reached that the most important factor concerned in the increased productivity of a soil from tile draining is the improvement in aeration. In order, therefore, to bring about more perfect aeration he conceived the idea of connecting the tiles with the atmosphere by means of flues, or pipes, which constitutes the method here described. It is maintained that such a system, which entails very little additional expense beyond that of the original cost of tiling, brings about a complete circulation of the air not only in the tiles but also in the soil and, furthermore, that the temperature and humidity of the soil and of the atmosphere tend to equalize as a result, thus having a most important bearing on the productivity of the soil.

Determinations were made from time to time of the organic matter content and oxidizing power of soils aerated in this manner as compared with soils not aerated. The results, although indicating greater bacterial activity in the aerated soil, are as yet inconclusive. The experiments are being continued.

On the penetration of soluble fertilizers into the soil, A. DEMOLON and G. BROUET (*Ann. Sci. Agron.*, 3. ser., 6 (1911), II, No. 6, pp. 401-418, figs. 2; *abz. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 4, pp. 897-899).—The investigations reported in this article have already been noted from a briefer report (*E. S. R.*, 25, p. 120).

The chemical composition of farmyard manure as a measure of its value, C. CROWTHER and A. G. RUSTON (*Trans. Highland and Agr. Soc. Scotland*, 5. ser., 24 (1912), pp. 219-236).—This article is based upon a study of the manure obtained in 2 steer feeding experiments, the object of which was "to compare a ration including a heavy allowance of roots and a moderate allowance of concentrated foods with another ration including a moderate allowance of roots and a high allowance of concentrated foods. The foods used were precisely the same in each ration, the difference simply being in the relative proportions of roots and concentrated foods."

The composition of the different lots of manure produced and their effects upon crops as tested in field trials are reported. It was found that "the difference in composition between the manures produced by animals fed under the same conditions but on different rations may differ widely from that which the composition of the foods consumed would lead one to expect. This is especially the case where the amounts of 'roots' included in the rations differ greatly. The chemical composition of the manures by itself is not a reliable measure of their relative values. . . . The richer manure in each case apparently [gave] the better crop, but the differences in value thus far realized [were] well below those calculated from the chemical composition by the ordinary method of computation."

The effect of watery foods (roots) in increasing the bulk and reducing the fertilizing value of the manure was marked.

The manufacture of nitrates from the atmosphere, E. K. SCOTT (*Jour. Roy. Soc. Arts*, 60 (1912), No. 3104, pp. 645-667, figs. 12; *Nature [London]*, 89 (1912), Nos. 2227, pp. 463-465, figs. 3; 2228, pp. 490-492, figs. 4).—This is a very complete account of the present status and outlook of this industry, describing the various processes in use, the capacity of the works, the cost of power, and the possible extension of the industry.

The manufacture of nitrates from the atmosphere, H. E. P. COTTRELL (*Jour. Roy. Soc. Arts*, 60 (1912), No. 3108, pp. 756, 757).—This article contains statistics on the world's production and consumption of ammonium sulphate and

the consumption of sodium nitrate, 1906 to 1911, inclusive, supplementing data given in the article by E. K. Scott noted above.

**Potash salts a protection against frost**, MAAS (*Illus. Landw. Ztg.*, 32 (1912), No. 6, pp. 39, 40, *figs.* 4).—Marked effects in preventing frost injury to rye and potatoes by liberal applications of potash salts are reported.

**Potash salts a protection against frost**, W. GOLTE (*Illus. Landw. Ztg.*, 32 (1912), No. 10, p. 77; *abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 4, pp. 902, 903).—Liberal applications of potash salts apparently prevented frost injury to rye by increasing the concentration of the soil water and thus preventing the freezing of the soil and by withdrawing a certain amount of water from the tissues of the plants.

**Fertilizer experiments with ground phonolite**, W. THAER (*Jour. Landw.*, 60 (1912), No. 1, pp. 19–30).—Comparative tests of 40 per cent potash salt and phonolite on beans and potatoes showed neither appreciable direct action nor effect of the potash in the phonolite.

**Results of investigations of the potash deposits of Upper Alsace**, B. FORSTER (*Mitt. Geol. Landesanst. Elsass-Lothr.*, 7 (1911), No. 4, pp. 349–524, *figs.* 7; *abs. in Kali*, 6 (1912), No. 4, pp. 77–81; *Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 4, pp. 901, 902).—The character of these deposits as determined by numerous deep borings is described. It is estimated that they are capable of yielding 1,472,058,000 metric tons of 22 per cent potash salts.

**The composition of the Pacific kelps**, J. W. TURRENTINE (*Jour. Indus. and Engin. Chem.*, 4 (1912), No. 6, pp. 431–435).—In analyses of 81 samples of oven-dried seaweeds from the Pacific coast the potash ( $K_2O$ ) varied from 0.37 per cent (equal to KCl 0.59 per cent) in the stipe of *Pterygophora californica*, to 9.9 per cent (equal to 47.5 per cent KCl) in bulbs of *Pelagophycus porra*.

“When the average potassium chlorid content of the 29 samples of the northern kelps (from Puget Sound) is compared with that of the 27 samples of the southern (from the region of San Diego), the respective values being 21.3 per cent and 23.4 per cent, it appears that the content of the southern plants exceeds that of the northern.” However, choosing the 4 varieties in the northern collection which occur in the greatest quantities (the genera *Nereocystis*, *Macrocystis*, *Postelsia*, and *Egregia*—9 specimens), the average KCl content is 25.7 per cent, and the 2 genera of the north considered as a commercial source of potash, *Nereocystis* and *Macrocystis*, show an average content for 6 specimens of 29.4 per cent. The average content of the 2 specimens of *Macrocystis* from Puget Sound is 26.5 per cent; that of the 22 specimens from the south is 21.6 per cent.

“The average iodine content of the 30 specimens from Puget Sound is 0.155 per cent and of the 4 main varieties (10 specimens) is 0.14 per cent. The average of 6 specimens of the 2 giant kelps, the *Nereocystis* and the *Macrocystis*, is 0.16 per cent. The average percentage content of the southern kelps is 0.29, a value nearly twice that from the northern kelps.”

Of the 3 giant kelps *Nereocystis* contained on the average 32.6 per cent KCl, 0.14 per cent iodine; *Macrocystis* 22.2 per cent KCl, 0.27 per cent iodine; and *Pelagophycus* 31.3 per cent KCl, 0.36 per cent iodine.

In addition to the variations in composition between the varieties of kelps there was a marked variation between members of the same genus from different localities and from the same locality. There is also a variation strikingly shown in the case of *Pelagophycus* between the different parts of a single plant. These differences have been pointed out by Balch.

From analysis of a limited number of kelps it was found that phosphoric acid varied from 0.51 per cent in *Pelagophycus porra* to 1.84 per cent in *Macrocystis pyrifera*, and sulphur from 1.08 in *Nereocystis leutkeana* to 3.45 in *M. pyrifera*.

**Significance of the word kainit**, A. ZARAGÜETA (*Jour. Agr. Prat.*, n. ser., 23 (1912), No. 18, pp. 556, 557).—It is stated that the natural salt found in the Stassfurt deposits to which the name kainit was originally given has, according to Precht, the formula:  $\text{MgCl}_2 \cdot \text{K}_2\text{SO}_4 \cdot \text{MgSO}_4 \cdot 6\text{H}_2\text{O}$ . The theoretical composition of kainit is  $\text{KCl} \cdot \text{MgSO}_4 \cdot 3\text{H}_2\text{O}$ , according to Van't Hoff, who showed that Precht was at fault in maintaining that the potassium was present as sulphate. In fact, in all of the natural potash salts of the German mines of most commercial importance the potassium is present as chlorid. The term kainit is used at the mines to designate all products containing from 12.4 to 16 per cent of potash soluble in water, and less than 6 per cent of magnesium chlorid soluble in alcohol. The kainit group is therefore usually a mixture of various salts in which, however, the potassium is always combined with chlorin. Salts containing over 6 per cent of magnesium chlorid soluble in alcohol are classed as carnallite.

**Discovery of chalk and phosphatic sands in the Department of the Yonne**, France, G. NEGRE (*Compt. Rend. Acad. Sci. [Paris]*, 154 (1912), No. 29, pp. 1314-1316).—The geological character and estimated extent of deposits in the vicinity of Sens are briefly discussed.

**Report on departmental experiments with ground limestone**, H. J. COBURN (*Agr. Gaz. Tasmania*, 20 (1912), No. 3, pp. 94-97, figs. 2).—The beneficial effect of ground limestone on mustard and rape in experiments here reported is ascribed to its favorable action on nitrification.

**Some bacteriological effects of liming**, P. E. BROWN (*Centbl. Bakt. [etc.]*, 2. Abt., 34 (1912), No. 4-7, pp. 148-172; abs. in *Jour. Chem. Soc. [London]*, 102 (1912), No. 597, II, p. 670).—This is substantially a reprint of matter contained in Iowa Station Research Bulletin 2 (E. S. R., 23, p. 428).

**Experiments on the action of sulphur as a fertilizer in 1911**, BERNHARD (*Deut. Landw. Presse*, 39 (1912), No. 23, p. 275).—Experiments are reported which showed marked benefit from applications of sulphur (44 lbs. per plat of 600 sq. yds.) on hoed crops, especially potatoes and mangolds.

**The fertilizing action of sulphur**, L. DEGRULLY (*Prog. Agr. et Vit. (Ed. F&E Centre)*, 33 (1912), No. 11, pp. 321-324).—This is mainly a review of investigations by Boullanger (E. S. R., 27, p. 27) and Demolon (E. S. R., 26, p. 819), with reference also to the suggestion of Gastine that the fertilizing effect of carbon bisulphid is due in part at least to the sulphur left in the soil in a free state of division.

**Sulphur as a fertilizer** (Abs. in *Internat. Inst. Agr. [Rome]*, *Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 5, pp. 1109-1111).—This is a review of investigations by Boullanger, Demolon, Bernhard, and Degruilly, referred to above.

**Sand and ashes from Vesuvius**, E. CASORIA (*Ann. R. Scuola Sup. Agr. Portici*, 2. ser., 9 (1910), Art. 6, pp. 26).—Analyses of a large number of samples show generally a rather high percentage of potash (about 7 per cent in some cases) and about 0.75 per cent of phosphoric acid.

**Artificial manures in Hungary**, DE MIKLÓS DE MIKLOSÁB (*Internat. Inst. Agr. [Rome]*, *Bul. Bur. Agr. Intel. and Plant Diseases*, 3 (1912), No. 4, pp. 894, 900).—It is stated that the use of fertilizers is increasing each year with the growing improvement in agriculture. The conditions under which the National Hungarian Agricultural Association will give prizes for the best articles on the importance of the use of superphosphates in Hungary are stated.

The consumption of chemical and mineral fertilizers in Spain, T. GALLEGO (*Mem. Dir. Gen. Agr., Minas y Montes [Spain], 1912, pp. 361-365, pl. 1; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 3 (1912), No. 5, pp. 1113, 1114*).—Statistics collected by the ministry of agriculture show a marked increase in the use of fertilizers due to an energetic propaganda, low prices, improved laws relating to inspection and purchase, and formation of purchasing associations. It is estimated that the total consumption in Spain in 1911 was 581,320 metric tons, of which 82,580 tons was consumed in Valencia alone. A large proportion of the fertilizers is now imported.

Inspection and analyses of commercial fertilizers in Mississippi, 1911-12, W. F. HAND ET AL. (*Mississippi Sta. Circ. 34, pp. 31*).—This circular contains the analyses and valuations of 88 samples of fertilizer drawn by regular inspectors and also guarantees for all brands registered to date.

Analyses of fertilizers, spring season, 1912, B. W. KILGORE ET AL. (*Bul. N. C. Dept. Agr., 33 (1912), No. 4, pp. 35*).—This bulletin contains analyses of fertilizers collected by the fertilizer inspectors of the state department of agriculture during the spring of 1912, as well as a list of brands of fertilizers registered for sale during the season 1911-12.

The inspection of cotton-seed meal, season 1911-12, W. F. HAND ET AL. (*Mississippi Sta. Bul. 156, pp. 3-33*).—This bulletin contains tables of analyses of samples of cotton-seed meal drawn by inspectors from shipments in various parts of the State and of so-called official samples forwarded by oil mills in accordance with the requirements of the law. The valuation of cotton-seed meal is briefly discussed.

The mixing of fertilizers, G. VECCHI (*Riv. Agr. [Parma], 13 (1912), No. 23, pp. 355-357*).—This is a brief discussion containing a convenient table showing compatibles and incompatibles in fertilizing materials.

Home mixing and general fertilizer formulas (*South Carolina Sta. Circ. 4, p. 7*).—Forty formulas for the use of farmers in preparing home mixtures of fertilizers are given.

## AGRICULTURAL BOTANY.

Practical botany, J. C. BERGEN and O. W. CALDWELL (*Boston, New York, Chicago, and London, 1911, pp. VII+545, figs. 338*).—This book is designed to supply the needs of students in secondary schools, the recommendations regarding the botanical courses suggested by the Botanical Society of America and the North Central Association of Colleges and Secondary Schools being followed. After treating of plant life and structures, the great groups of plants are discussed at some length. The authors include the principles of plant nutrition, and the relation of plant nutrition to soils and climate and to the food of animals and men. Discussions are also given of diseases produced by parasitic fungi, the propagation of plants, plant breeding, forestry, and the main uses of plants and plant products.

The relative amount of information of economic importance that is included in this work makes it appear to be well adapted to secondary schools, particularly those leading to higher institutions where the economic relations of plants are stressed.

A laboratory manual of general agricultural bacteriology, E. G. HASTINGS, HOFFMANN, and W. H. WRIGHT (*Madison: Univ. Wis., 1911, pp. 47*).—This manual gives an outline of a course of laboratory instruction which is designed to convey to the student some of the principal relations of bacteria to farm operations and to illustrate their importance in the daily life of the farm. The

four principal divisions treated are soil bacteriology, dairy bacteriology, the bacteriology of the diseases of animals, and the bacteriology of foods.

A biologic and taxonomic study of the genus *Gymnosporangium*, F. D. KERN (*Bul. N. Y. Bot. Gard.*, 7 (1911), No. 26, pp. 391-494, pls. 11, figs. 36).—The results of a study begun at the Indiana Station in 1906 on the biology and taxonomy of the genus *Gymnosporangium* are given. Preliminary notes on some of the phases of the investigation have appeared previously (*E. S. R.*, 19, p. 754; 20, p. 453; 23, p. 354).

The author recognizes 40 species of the fungus, all of which are described at length. Under the biological studies accounts are given of experimental investigations on the life histories of different species of the fungus. Cultures were made of 26 species and in 18 they were successful. Of this number 9 were cultivated for the first time and their alternate hosts demonstrated, the others confirming previous reports.

The economic importance of the species is discussed, especially those whose aecidial forms occur on such trees as the apple, pear, and quince. The methods of control that have been suggested are reviewed, and the author points out some of the difficulties attending spraying by reason of the prolonged season of the maturing of the teleutospores. The planting of resistant varieties of apples, pears, etc., is thought to offer promising results.

Natural history, morphology, and cytology of *Azotobacter chroococcum*, A. PRZYMOWSKI (*Centbl. Bakt. [etc.]*, 2. Abt., 33 (1912), No. 11-14, pp. 292-305).—This is a somewhat detailed biological study of this dimorphic schizomycete.

It is stated that morphologically it presents itself in its first or vegetative stage as a bacterium, in the fruiting stage as a micrococcus. Under certain circumstances it resembles a ciliated free-moving fission fungus. The division of the nucleus marks the first step in cell division. In the resting stage the nucleus assumes a globular form, having a strongly refractive nucleolus, with clearly differentiated bounding layer. The individuality of the nucleus appears to be practically lost at times owing to its relations to the cytoplasm. The so-called sarcina forms are said to be morphologically and physiologically similar to the endogenous spores of other bacteria, in particular *Bacillus bütschlii*.

The physiology of denitrifying bacteria, H. VON CABON (*Centbl. Bakt. [etc.]*, 2. Abt., 33 (1912), No. 1-6, pp. 62-116).—This is an account of the author's studies in extension of the work of Koch and Pettit (*E. S. R.*, 23, p. 123), employing cultures in soil of 3 common denitrifying bacteria, viz. *Bacterium hartlebi*, *Bacillus pyocyaneus*, and *Bacterium fluorescens liquefaciens*. The investigations relate to the requirement and utilization of food and energy materials by these bacteria in denitrification and the influence of atmospheric oxygen in that process. The principal conclusions announced are as follows: Dextrose is a most suitable source of energy for nitrate reduction. So is fresh straw; but in rotting this loses much of its available carbon; so that compost seldom shows much loss of nitrates by bacterial activity. Cellulose may also serve as a source of energy in mixed cultures but in less degree. Other sources of energy of varying availability are mentioned. The addition of pfitrogen increases the rate of denitrification, and this rises toward a maximum of intensity per unit of energy used.

Investigations in the presence of hydrogen tend to confirm the view that denitrifying bacteria are responsible for the loss of nitrates observed to occur in the presence of a source of energy and of nitrates with exclusion of air. The hydrogen is said to play here the rôle of a too high water content in the soil; whence it is inferred that any means of excluding air in soils may lead to

nitrate destruction by these bacteria when present and other conditions are favorable.

The most divergent denitrifying organisms appear to act in the same ways on exclusion of oxygen. Simultaneously with the admission of air an increase of protein occurs with coincident increase of energy requirement. The most diverse experiments indicate that the degree of air access did not affect the relation between synthesis and use of energy material.

The 3 bacteria studied do not show the same activity and nitrate requirement per unit of energy material used. The optimal relation between the carbon and the nitrate used is for the 2 stronger bacteria (*B. pyocyaneus* and *B. fluorescens liquefaciens*) 1 per cent dextrose to 1.6 per cent potassium nitrate. Reduction of nitrate supply far below that of carbon greatly reduces the intensity of the process. All of these 3 kinds of bacteria use carbon the more freely as more individuals are present. With a sugar concentration of more than 1 or 2 per cent, a depression of denitrification occurs, as thereby (through the building of fatty acids) the development of the denitrifying bacteria is retarded. The increase of alkaline carbonates has the opposite effect. Increased concentration of dextrose within limits is accompanied by its increased employment as a source of energy.

These experiments confirm the findings of Koch and Pettit and of Marr (E. S. R., 23, p. 430) that in the soil, under otherwise favorable conditions of moisture, etc., a loss of nitrates may still occur. No certain explanation is at hand, but the suggestion is made that an increased production of carbon dioxide and the indirectly produced exclusion of air may in part account for the destruction of nitrates observed.

It is suggested also that an explanation may now be expected of the very different results obtained by investigators, and that a point of departure for investigations of great importance has been reached.

Metabolism and translocation in young foliage trees, H. BAUER (*Naturw. Ztschr. Forst u. Landw.*, 9 (1911), No. 9, pp. 409-419).—This is a further account of the author's investigations of the nutritive changes in young trees (E. S. R., 25, p. 27). This report gives detailed and tabulated particulars of changes (expressed in percentages) observed in the study of the second year's growth of ash trees during the four successive periods of about 80, 50, 70, and 0 days, extending from February 27 to November 17.

The periodicity of nutritive processes in young beeches, W. KÜBLER (*Naturw. Ztschr. Forst u. Landw.*, 10 (1912), No. 4-5, pp. 161-187, figs. 2).—This is contributory to the work of E. Ramann (E. S. R., 26, p. 443; 27, p. 229) and of H. Bauer (see above). The author investigated the seasonal changes occurring in beeches of 2 years' growth as regards nutritive requirements, reformation of dry substance, etc., in the plants. The results are given in tabular form of analyses made of the whole plant, of stem and root, together and separately, and of the leaves.

The results as regards the whole plant, which are graphically represented, show that phosphoric acid, nitrogen, potash, lime, and magnesia (which follow much the same general course but show individual differences) all decrease till early in May. The percentages then rise sharply until about the middle of September when a decline almost as steep sets in, reaching by November approximately the same levels as about the middle of July. The curves are very much steeper in case of those plants grown under the more favorable conditions.

The periodicity of synthetic processes in young foliage trees, H. BAUER (*Naturw. Ztschr. Forst u. Landw.*, 10 (1912), No. 4-5, pp. 188-199).—This is a report in continuation of the work carried on by this author, E. Ramann, and



W. Kübler (see above). Beginning on March 15 with oaks about 1 year old, analyses were made of the growing plants after four successive periods of 70, 32, 36, and 50 days, closing September 19. The results of these numerous analyses as regards potash, soda, lime, magnesia, oxid of iron, silicic acid, and nitrogen found in the whole plant, the stem and root, and the foliage, respectively, are given in tabular form.

The relations between changes in protein structure and respiration.—I. The influence of atmospheric oxygen on proteolytic ferments in plants, W. PALLADIN and G. KRAULE (*Biochem. Ztschr.*, 39 (1912), No. 3-4, pp. 290-301).—From studies of *Agaricus campestris* and etiolated leaves of *Vicia faba*, both in ordinary air and in an oxygen-free atmosphere, the authors conclude that autolysis of proteins in killed plants is increased by the presence of oxygen in the amount found in ordinary air, especially where the plants are of loose structure. The dependence of autolysis upon oxygen is probably indirect. It is claimed that the various ferments present may work independently or even antagonistically in the cells of the dead plants, but that the conditions most favorable to the work of such ferments have not yet been ascertained.

The significance of respiration pigments in the oxidation processes of plants, W. PALLADIN (*Ber. Deut. Bot. Gesell.*, 30 (1912), No. 3, pp. 104-107).—In continuation of previous work (*E. S. R.*, 25, p. 124; 26, p. 326), the author presents a preliminary report on his later investigations on this subject, the principal conclusions being as follows:

(1) The rôle played by respiration pigments in the oxidation processes consists in the withdrawal of hydrogen from the substance to be used as an oxidizer. (2) The oxidases are water-forming ferments. (3) During respiration all the hydrogen of the glucose is oxidized exclusively through the oxygen of the air. (4) The water formed during respiration is exclusively of aerobic origin. (5) The oxidation of glucose, with the aid of respiratory pigments, takes place with participation of water. (6) The oxidation of glucose during respiration goes on with the employment partly of the oxygen from the water assimilated in the process of respiration, partly of that from the glucose. (7) During respiration, water is not only separated but is also assimilated. A brief discussion is given of some of the changes involved in these processes.

The influence of diastase and of emulsin on alcoholic fermentation and the respiration of plants, S. L'vov (*Ztschr. Gärungsphysiol.*, 1 (1912), No. 1, pp. 19-44, fig. 1).—Substantially the same as an article already noted (*E. S. R.*, 27, p. 221).

The relation of protoplasmic-streaming movements to movements of starch grains within the cells, A. L. HELLBRONN (*Ber. Deut. Bot. Gesell.*, 30 (1912), No. 3, pp. 142-146).—A preliminary report on investigations still in progress.

In the course of his studies, first with *Phaseolus multiflorus* and *Vicia faba* and later with *Calceolaria chelidonioides*, *Verbascum thapsus*, and *Mimulus moschatus*, the author found that if cells are placed in their natural position with the starch grains lying on the lower cell wall and the cells are then rotated through 180° the grains after 10 or 15 minutes begin to descend, partly in consequence of protoplasmic movement but partly by gravity, some passing through the vacuole, each grain or group in such case pulling through after it a thread of protoplasm. After reaching the bottom, which required from 10 to 28 minutes, the grains were observed to be carried upward and around by the protoplasmic movement which, once started, persisted for from 40 to 70 minutes.

The author expresses the opinion that either the weight of the starch is the stimulus to further motion of the plasma to which the cell reacts in this way, or

else that the effects of the friction of the starch grains or the impetus of their descent are communicated to the medium. It is suggested that a way is thus opened for further study of the properties of the several cell contents.

The carbohydrates of the snowdrop leaf and their bearing on the first sugar of photosynthesis, J. PARKIN (*Bio-Chem. Jour.*, 6 (1911), No. 1, pp. 1-47, No. 4).—This is a fuller account of work already in part reported (*E. S. R.*, 21, p. 319).

The results as first given have been confirmed. Only 3 carbohydrates were present in these leaves in appreciable quantity, viz, sucrose, glucose, and fructose. The total quantity of these in a leaf was from 20 to 30 per cent of the dry substance, or from 4 to 6 per cent of the fresh, active leaf. The greater proportion in the lower part of the leaf may be due to the greater shading of this part as the amount was greater in leaves from thick clumps. The lower part of the leaf seems to function somewhat as storage tissue for sugars when obscured. It seems that, as spring advances, the hexoses increase at the expense of the sucrose. The leaves, when detached and insulated, contain decidedly more sucrose than their controls, while the quantity of hexoses remains much the same. The fructose as a rule is in excess of the glucose. Leaves when darkened lose sucrose rapidly during the first 48 hours, after which the proportion remains fairly constant.

In general, the results favor the conclusion announced by Brown and Morris that sucrose is the first sugar to arise on photosynthesis, and that the two hexoses, glucose and fructose, as well as starch, are derived from sucrose. Important services by sucrose in relation to circulation, storage, and transformation purposes are suggested.

The origin and function of pentosans in plants, C. RAVENNA, O. CERESER, and O. MONTANARI (*Gaz. Chim. Ital.*, 41 (1911), II, No. 2, pp. 115-129).—Substantially the same work as previously reported (*E. S. R.*, 24, p. 228), with the conclusions that the pentosans probably have their origin in sugars and that among other functions they perform that of storage of reserve materials.

The significance of mucilage in the germination of seeds, C. RAVENNA and I. ZAMOMANI (*Gaz. Chim. Ital.*, 41 (1911), II, No. 2, pp. 138-143).—This is substantially the same as a report previously noted (*E. S. R.*, 24, p. 534).

Dimorphism of chlorophyll grains in some plants, U. GIOVANNONZI (*Nuovo Hor. Bot. Ital.*, n. ser., 19 (1912), No. 1, pp. 39-51, figs. 2).—Studies carried on with numerous plants, more particularly *Portulaca oleracea* and *Alternanthera versicolor*, led the investigator to the conclusion that the dimorphism of chloroplasts, observed in numerous and widely separated groups, is related to the environment of the plant and the principal function of the cells under observation. In leaf parenchyma of mainly assimilative function the chloroplasts were found to be larger and more active, while in regions more concerned with conduction these grains were reduced in size and seemed to be less active. Heat, dryness, and light also appear to show some relation to the differences observed.

Remarks on a new method of studying stomatal aperture of stomata, EMMY STRIN (*Ber. Deut. Bot. Gesell.*, 30 (1912), No. 2, pp. 66-68).—Concerning the method described by Molisch (*E. S. R.*, 27, p. 221) which is stated to have been previously discovered and used by others, the author makes the following claims:

The number of substances suitable for the purposes of infiltration is much larger and the range of possibilities of the method is much greater than claimed by Molisch. For example, melted paraffin, entering only wide apertures, and petroleum ether, which penetrates exceedingly minute ones, are much further apart than are alcohol and benzol. It is claimed that estimates of apertures

may be made with a high degree of accuracy beyond the point where Mollach regarded the stomata as practically closed. Also, these more sensitive indicators are less injurious to the cells than are benzol and xylol.

Heterozygosis in evolution and in plant breeding, E. M. East and H. K. Hayes (*U. S. Dept. Agr., Bur. Plant Indus. Bul. 243, pp. 58, pls. 8*).—In co-operative work between this Department, the Connecticut State Station, and the Bussey Institution, the authors have studied heterozygosis in evolution and in plant breeding, predicating their belief that Mendel's law—that is, the segregation of character factors in the germ cells of hybrids and their chance recombination in sexual fusions—is a general law; that stimulus to development is greater when certain, or possibly all, characters are in the heterozygous condition than when they are in a homozygous condition; and that this stimulus to development is cumulative up to a limiting point and varies directly with the number of heterozygous factors in the organism.

Their studies were made with 30 varieties of maize and several species of Nicotiana. As a result of their investigations the authors believe they have demonstrated that "the decrease in vigor due to inbreeding naturally cross-fertilized species and the increase in vigor due to crossing naturally self-fertilized species are manifestations of one phenomenon, heterozygosis. Crossing produces heterozygosis in all characters by which the parent plants differ. Inbreeding tends to produce homozygosis automatically. The phenomenon exists and is in fact widespread in the vegetable kingdom. Inbreeding is not injurious in itself, but weak types kept in existence in a cross-fertilized species through heterozygosis may be isolated by its means. Weak types appear in self-fertilized species, but are eliminated because they must stand or fall by their own merits."

The experimental data upon which these conclusions are based have been obtained entirely from plants, but observations on animal hybrids and published records lead the authors to believe that the facts are the same among animals, and that their conclusions will apply equally to the animal and the vegetable kingdoms where organisms are reproduced sexually.

A bibliography is appended.

The inheritance of red color, and the regularity of self-fertilization in the common jute plant, R. S. Finlow and I. H. Burkell (*Mem. Dept. Agr. India, Bot. Ser., 4 (1912), No. 4, pp. 73-92*).—From 1902 to 1907 the authors made a survey of the different races of jute cultivated in India, and as a result of their survey they recognize 33 races, including 3 which are grown as vegetables. These are grouped according to color types, and the inheritance of color in them is shown.

It is stated that when a pure green jute is crossed with a fixed red plant the Mendelian law is obeyed, the red acting as a simple dominant. The  $F_1$  generation of hybrids appears to consist of plants of one tint of redness. The  $F_2$  generation, on the other hand, varies widely in the amount of red color the plants contain.

The authors in their studies found that self-fertilization is the rule with this plant, probably not more than 2 per cent of the plants under the most favorable conditions being the result of cross breeding.

Department of botanical research, D. T. MacDougal (*Carnegie Inst. Washington Year Book, 10 (1911), pp. 49-68, pl. 1*).—An outline is given of the investigations carried on by the staff attached to the botanical research laboratory at Tucson, Ariz., a number of the investigations having been previously reported upon at length (*E. S. R., 25, pp. 219, 327, 732; 26, pp. 433, 532, 623; 27, pp. 29, 329, 381*).

## FIELD CROPS.

Water requirements of crops in India, II, J. W. LEATHER (*Mem. Dept. Agr. Indis., Chem. Ser., 1 (1911), No. 10, pp. 205-281, pl. 1, figs. 34*).—Earlier work by this author on the same subject has already been noted (E. S. R., 23, p. 331). Tables and charts present data on the amount of water transpired by corn, wheat, flax, barley, oats, gram (*Cicer arietinum*), peas, sugar cane, and rutabagas on various soils, in pots of different sizes, and when treated with various fertilizers. From these and other data presented the author draws certain conclusions.

The ratios between the amounts of water transpired and the crop weights produced were apparently not affected by the nature of the soil so long as the water supply did not fall below a certain concentration. The concentration of water in the soil required for good development varied with the soil. In the Pusa soil, 10 per cent was sufficient for good plants, but in a soil designated by the author as black cotton soil, 25 per cent sufficed only for the most meager growth. The reduction in concentration in the Pusa soil was more or less uniform for about 5 or 6 ft., below which the change was smaller. After allowing for the moisture which evaporated directly from the soil into the air, a comparison of the observed decrease of water in a unit column of soil with the crop weight produced gave approximately the same ratio as that obtained by the pot culture method. Thus most of the water required was accounted for by the observed decrease of water within the root range, while the data obtained in these experiments may be accounted for by supposing that the quantity of water which moves through the soil in a time unit is dependent on concentration, distance, and physical character of the soil. The author believes that temperature also has an important influence and that a laboratory method for the estimate of the soil's water-conducting capacity would be desirable.

[Dry farming soil preparation methods], A. E. V. RICHARDSON (*Dept. Agr. Su. Aust., Rpt. Dry Farming Conf., 1 (1911), pp. 14, 15*).—The results given are for the third year of a test already noted (E. S. R., 26, p. 631).

During this third season only slight differences could be attributed to variations in time or frequency of subpacking. The 3 plats plowed 6 in. deep gave slightly lower yields than those plowed only 4 in. deep. From the test as a whole, however, the author concludes that subpacking gives a substantial profit under the conditions obtaining at Hammond in South Australia.

[Field crops at the Delta substation, 1911], G. B. WALKER (*Mississippi Sta. Bul. 157, pp. 3-10, 13-23, figs. 4*).—In a variety test of wheat the estimated yields ranged from 16 to 35 bu. per acre, the leading varieties apparently being Blue Stem and Klondike.

In a fertilizer test with cotton of cotton-seed meal, acid phosphate, and kainit applied singly and in various mixtures, the highest yields and the greatest net increases in value, after deducting the cost of fertilizers, followed applications of (1) 200 lbs. cotton-seed meal and 50 lbs. kainit, (2) 200 lbs. cotton-seed meal, 150 lbs. acid phosphate, and 50 lbs. kainit, and (3) 150 lbs. acid phosphate, and 50 lbs. kainit. In a test of applications of lime alone and in a mixture with other materials the yield of 1,366 lbs. of seed cotton per acre followed an application of 1,000 lbs. of lime as compared with 1,516 lbs. on the check plat, and 1,866 lbs. after an application of 200 lbs. cotton-seed meal, 150 lbs. acid phosphate, 50 lbs. kainit, and 1,000 lbs. lime. In another test the total seed cotton yield on the check plat was 1,549 lbs. as compared with 1,649 lbs. after what the author terms a normal application of 200 lbs. cotton-seed meal, 150 lbs. acid phosphate, and 50 lbs. kainit. A yield of 1,733 lbs. followed an application of double this normal mixture.

In another comparison "of varying amounts of cotton-seed meal, acid phosphate, and kainit, other elements being normal, with no fertilizer," the highest yield followed an application of 600 lbs. cotton-seed meal, 150 lbs. acid phosphate, and 50 lbs. kainit, but the highest net profit followed the use of 200 lbs. cotton-seed meal, 150 lbs. acid phosphate, and 50 lbs. kainit. On another plot, however, this latter mixture was applied at an apparent financial loss. In a test of different nitrogen sources and of applications made entirely at planting time, or half at planting and half on July 20, 2,483 lbs. of seed cotton per acre was obtained after fertilization with 80 lbs. of nitrate of soda on each of these two dates as compared with 2,133 lbs. when 160 lbs. were applied at planting time. An application of 400 lbs. of cotton-seed meal was followed by a lower yield than that secured on the check plot. An application of 200 lbs. of cotton-seed meal at planting time and 80 lbs. of nitrate of soda, July 20, was followed by a yield of 2,210 lbs. of seed cotton per acre. This application ranked second in value of increased yield over the cost of the fertilizer used, the divided application of nitrate of soda being first in this respect as well as in yield. Spacing and variety tests are noted on page 434.

Better yields of peanuts were obtained from plants planted during the first week in June than on other dates, and from plantings 18 in. apart in rows 3 ft. apart than at other distances. No increase in yield followed the use of fertilizers for peanuts on a fertile sandy loam.

Brief progress reports are also given on tests with corn, alfalfa, oats, and soy beans, and with wheat and vetch followed by soy beans.

[Cabbage and potatoes at the New Mexico Station], F. GARCIA (*New Mexico Sta. Rpt. 1911, pp. 33-37, fig. 1*).—Four different plantings of cabbage were made at intervals of about 2 weeks, beginning March 2. The earliest planting gave the best results on the whole, but the second planting did almost as well, while the last planting, made April 17, was too late to do much good.

Practically no yields of potatoes were secured in either plat or pot tests. The plants in pots in a more humid section of the greenhouse grew considerably taller than those in the drier portion or those in the field, but the size of the vines did not seem to affect materially the size or yield of tubers.

Results of cooperative experimental work for 1911, F. G. TABBOT, JR. (*South Carolina Sta. Circ. 5, pp. 3-19*).—The results of cooperative experiments the station is conducting with farmers in the State are briefly noted. In the spring of 1911, the station distributed among the farmers of the State for this work about 140 bu. of cotton seed, about 60 bu. of corn of the Marlboro Prolific, Boone County White, and Coker Williamson varieties, and a quantity of seed of winter cover crops, including vetch, clover, and rye.

Tables of field crops, J. N. HARPER (*South Carolina Sta. Circ. 2, pp. 18*).—Popular information regarding the culture of field crops adapted to the South is presented in tabular form.

Competition in cereals, E. G. MONTGOMERY (*Nebraska Sta. Bul. 127, pp. 3-22, figs. 7*).—This bulletin states the results of tests in which wheat and oats were planted  $\frac{1}{4}$ ,  $\frac{1}{2}$ , 1,  $1\frac{1}{2}$ , and 2 in. apart in rows to determine the percentage of plants which survive competition of these different degrees of intensity. The competition of well developed with poorly developed kernels and of one variety with another was also tested. Data are presented in 19 tables from which the author concludes that the percentage of plants which survive until harvest decreases as the rate of planting is increased. In these tests the total decrease amounted to 34 per cent and the relative survival of the thinnest and thickest stands averaged 75 and 56 per cent, respectively.

When plump and small or poorly developed seed were alternated in the same row, the decrease in number of plants was 28 and 38 per cent, respectively, but

when the same grades were planted alone the decreases were 35 and 40 per cent. Plants from all grades decreased markedly from various causes besides competition. Since natural elimination of weaklings from either large or small seed has been going on for ages, it would seem that artificial seed separation by fanning mill or screens could not increase the efficiency of seed, particularly since the usual method of thick seeding permits the natural elimination of one-half the plants without affecting the yields.

The desirability of separating pure strains is indicated by the fact that the variety which when sown alone is the best yielder, in a mixed sowing may be dominated by a less productive type. When the seeds of 2 varieties were alternated in the same row, the yield of the mixture was always greater than that of either variety alone. Seed from corn strains which had been grown for 6 years at the rates of 1, 3, and 5 plants per hill averaged 34.9, 38.5, and 41 bu. per acre, respectively, in 1911.

The manuring of grass land (*Univ. Col. Reading, Dept. Agr. and Hort. Bul.* 13, 1910; *abs. in Jour. Bd. Agr. [London]*, 18 (1912), No. 11, p. 941).—A brief progress report on fertilizer and other tests conducted at 9 points in Oxfordshire in 1900-10. Phosphorus applications gave profitable returns in most localities and the addition of potash and nitrogen still further increased the yields.

The manuring of grass land (*Univ. Col. Reading, Dept. Agr. and Hort. Bul.* 13, 1910; *abs. in Jour. Bd. Agr. [London]*, 18 (1912), No. 11, p. 941).—This is a report of tests similar to those noted above, but conducted at 18 points in Bucks.

The grasses and grass-like plants of New Mexico, E. O. WOOTTON and P. C. STANLEY (*New Mexico Sta. Bul.* 81, pp. 176, pls. 12, figs. 32).—This bulletin is intended to supply information with regard to the individual grasses and grass-like plants of New Mexico to dry farmers, stockmen, and students. It contains a tentative relief map and an outline map showing the distribution of the principal grass societies, a technical description of each species, and a key for their determination.

Studies in Indian fiber plants, A. and G. L. C. HOWARD (*Mem. Dept. Agr. India, Bot. Ser.*, 4 (1911), No. 2, pp. 9-36, pls. 7).—Notes are given on the botanical and other characters of varieties and types of *Hibiscus cannabinus* and *H. sabdariffa*.

Peruvian alfalfa, A. OPAZO (*An. Agron. [Santiago de Chile]*, 6 (1911), No. 3-4, pp. 365-375).—A brief account is given of tests of Peruvian and Chilean alfalfa sown separately and mixed in various proportions. Physical and chemical analyses of the soil of the Coquimbo experiment fields are also reported.

Lucern (*Jour. New Zeal. Dept. Agr.*, 4 (1912), No. 3, pp. 188-190, figs. 2).—Notes on the vegetation habits of a number of alfalfa varieties tested are given.

Tests of treated and untreated beet seed, H. K. GÜNTHER (*Centbl. Zuckerindus.*, 19 (1911), No. 30, p. 1021; *abs. in Centbl. Bakt. [etc.]*, 2. Abt., 32 (1912), No. 6-12, p. 308).—Additional tests of prepared seed (*E. S. R.*, 25, p. 135) showed a greater percentage of germination, a higher degree of resistance to injurious influences, and a tendency to earlier sprouting. It is stated also that the favorable yield reported from the earlier observations was maintained.

Germination tests of the different colored seeds of red clover, B. KAJANUS (*Landw. Jahrb.*, 41 (1911), No. 3-4, pp. 527-533).—Tables state in full the data obtained in germination and other tests of red clover seed of different colors. The relation of color to rate of germination is also discussed, and a bibliography of 4 titles is given.

Yellow and brown seeds appeared about equal in weight, but violet seeds were much heavier. Violet seeds germinated somewhat better than yellow ones and both excelled brown seeds in this respect. The percentage of hard seed was

exceedingly variable, and although it averaged lowest among the violet and highest among the brown seeds it had no apparent connection with color.

Native seed corn, E. G. MONTGOMERY (*Nebraska Sta. Bul.* 126, pp. 3-43, figs. 4).—At the Nebraska Station native seed of 6 leading corn varieties was compared for 2 and 3 years with that grown in either Iowa or Illinois. In every case the native seed gave the better yield, the average difference being 6.2 bu. These tests were conducted during the period 1903-1905. In 1909 seed representing 3 different degrees of acclimatization was tested. Show corn of varieties grown in Illinois, Indiana, and Ohio produced average yields of 39.8 bu. per acre as compared with 45.6 bu. per acre in case of 5 varieties of Nebraska grown seed and 48.8 bu. per acre in case of 7 local varieties grown near the station.

In central and western Nebraska a number of farmers conducted cooperative tests in 1908-9. In 1908 varieties native to the localities of those reporting averaged 30.5 bu. per acre as compared with 24.1 bu. per acre from seed furnished by the station from western or central Nebraska. In 1909 the varieties could be divided into 3 groups: Those from eastern Nebraska, which gave an average yield of 20.9 bu. per acre, those from central and western Nebraska which averaged 21.9, and those from the growers' own or native seed which averaged 25.4 bu. per acre.

It is concluded that it will be safer for growers in western Nebraska to use their native seed than to try importing seed, even from the eastern part of the State.

Studies in water requirements of corn, E. G. MONTGOMERY and T. A. KRESSELBACH (*Nebraska Sta. Bul.* 128, pp. 3-15, figs. 4).—The authors summarize the results of earlier work at this station on the water requirements of corn, already noted (*E. S. R.*, 24, p. 137; 25, p. 382).

As it has been noted in the past that water loss was more closely related to humidity than to any other factor, the humidity of one greenhouse was maintained at that of the surrounding atmosphere by leaving it open, while that of another was kept much higher by means of atomizers and wet floors. Eight corn plants were grown in each house. Some of the data collected for those grown in the dry and humid greenhouses, respectively, were mean relative humidity at night, 48 and 72 per cent; by day, 37 and 58 per cent; mean temperature at night, 80 and 75° F.; by day 91 and 88°; total weight of 8 plants, 70.36 and 861.77 gm.; average leaf area per plant, 1,079 and 1,070 sq. in.; total water used, 227.785 and 184.230 kg.; water to produce 1 gm. of dry matter, 340 and 191 gm.; water per square inch of leaf area, 27.3 and 19.2 gm.; and water vaporated from 36 sq. in. of free surface, 3,891 and 2,187 gm. These figures are for 1911. In 1910 and 1911, 250 and 345 gm. of water, respectively, were required per gram of dry matter produced.

In work on the relation of water requirements to soil fertility, 3 lots of 4 cans each were filled respectively with an infertile, residual sandstone soil, a quite fertile black alluvial pasture soil, and a mixture of the two. Another series of cans also received 2.4 lbs. per can of moisture-free sheep manure, equivalent to an application of 12 tons per acre. Analyses of the soils used are given. The water requirements of the infertile, intermediate, and quite fertile soils were found to be 549.5, 478.9 and 391.8 gm., respectively, per gram of dry matter produced as compared with 350.3, 341.3, and 346.6 gm. in case of the manured soils. For the fertile soil the decrease was small, and it is considered doubtful whether, under field conditions, adding manure to soils of good fertility would decrease the water requirements.

The "Williamson Plan" of corn culture (*South Carolina Sta. Ctrc. 3, pp. 1*).—A description of the Williamson method reprinted from Bulletin 124 (E. S. 1, 18, p. 731).

Cotton in Hawaii, C. K. McCLELLAND and C. A. SAHR (*Hawaii Sta. Press vol. 34, pp. 24, figs. 2*).—This is a report on the cotton industry of the Hawaiian Islands, which contains directions for the production of the crop and a statement of the results of experiments on Sea Island and Caravonica cottons in continuation of earlier work (E. S. R., 27, p. 135).

As regards Caravonica cotton, "the yield per acre upon the station grounds from 1-year-old trees which had been pruned in December, 1910, was at a rate of 531 lbs. of lint per acre. Upon similar trees pruned in March, 1911, the yield was only at the rate of 363 lbs. per acre, the average yield upon the field being 448 lbs. per acre, which is approximately four times the yield that was obtained from the same field in 1910."

Pinching back undertaken to induce the growth of fruiting branches and increase the yield restricted vegetative growth but showed no great effect on the yield.

A brief note is given on a trial of semiannual pruning and the production of 2 crops per year by E. C. Smith, a pioneer cotton grower of Pearl City, Oahu. The method consists in picking a crop in June and July, immediately pruning back the plants and giving enough irrigation to start new growth, which makes a crop in December and January. At this time another pruning is given which results in another crop in June and July. "Upon 3-year-old plants pruned in July of 1910 a winter crop of 2.5 lbs. per tree was obtained, while in the following July 4.7 lbs. were picked, making a total of over 7 lbs. seed cotton per tree for the year." This includes all the cotton which opened on the pruned branches within 2 weeks after pruning. When the entire neighborhood follows this method the cotton bollworm can be controlled at nominal expense.

Sea Island cotton seemed to thrive better as an annual than as a perennial, and an acre produced 292 lbs. of lint.

Recent cotton experiments (*Mississippi Sta. Bul. 155, pp. 29*).—This is a continuation of earlier cotton experiments in Mississippi (E. S. R., 23, p. 39), and consists of 4 papers.

I. *Results from the Central Experiment Station*, J. W. Fox et al. (pp. 4-14).—Meteorological data are followed by a statement of the results of a variety test in which Sunflower, Rowden 116, Columbia, and Cook stood highest in total value of lint and seed per acre in 1911. In 1910, 5 strains of Cook and the Triumph and Covington-Toole varieties constituted the first 7 in money value.

Applications of 238 lbs. each of kainit and acid phosphate were followed by approximately equal 5-year average yields, both greater than those secured when either was applied with cotton-seed meal or when both were used together. Still higher yields, however, followed the application of 8 tons of manure or of 4 tons of manure with phosphate, kainit, or lime. Another table states the relative earliness of the crop secured after the various applications in different fertilizer tests in 1911.

"The application of from 200 to 400 lbs. of potash to land on which cotton rusts badly is usually profitable." "We do not get profitable results from potash used here on soils where cotton does not rust."

Cotton topped July 15 and August 1 yielded 1,931 and 1,788 lbs. of seed cotton per acre, respectively, as compared with 1,756 lbs. secured from the untopped cotton. The order of yields was exactly reversed in 1910, but the dates of topping were about a week later. In 1909 the untopped cotton and that topped



August 1 yielded 1,464 and 1,590 lbs. per acre, respectively. In 1907 the cotton topped August 3 yielded 1,808 lbs., as compared with 1,575 lbs. on the check plot, and that topped August 26 yielded 1,780 lbs. as compared with 1,821 on the corresponding untopped or check plot.

Rows 3 ft. apart produced more cotton than those farther apart, in 1911, but were not included in the 1909 test when 4-ft. rows gave greater yields than either 5 or 6 ft. rows. In these tests the plants averaged 15 in. apart in the row. In rows 3 ft. 8 in. apart, plants spaced 12 in. apart gave greater 2-year average yields per acre than those spaced 20 or 30 in. apart.

Poisoning the army worm on August 20 and 30 resulted in a yield of 1,414 lbs. of seed cotton per acre as compared with 767 lbs. on the untreated plots. Paris green appeared to be more effective than arsenate of lead.

II. *Results from the McNeil Experiment Station, E. R. Ferris (pp. 14-21).*—Meteorological data are followed by a statement of the results of a variety test in which Ashcraft Double Jointed Snow Bank, Trice, and Truitt 90-day produced the highest yields.

A table states the 6-year average results secured in a test of various fertilizers. The highest yields were obtained after applications of (1) 100 lbs. each of cotton-seed meal and acid phosphate, and (2) 100 lbs. each of cotton-seed meal, acid phosphate, and kainit. Both plots were on land on which cattle were fed during the winter of 1902-3. On land on which cattle had not been fed the highest yield followed an application of 200 lbs. of cotton-seed meal and 100 lbs. of acid phosphate. Cotton planted April 1 gave 278 lbs. per acre as compared with 289 lbs. from that planted April 15, 55 lbs. from that planted May 1, and a total failure in case of that planted May 15.

III. *Results from the Holly Springs Branch Experiment Station, C. T. Ames (pp. 22-27).*—In a variety test at this station the highest yields of lint cotton per acre were given by Truitt 90-day, Broadwell Double Jointed, and Rowden 116. In the fertilizer test the highest yields followed applications of (1) 200 lbs. acid phosphate (2) 100 lbs. each acid phosphate and cotton-seed meal, and (3) 200 lbs. cotton-seed meal, in the order named. Ten applications were tested in this series of experiments and in a parallel series 7 of them were duplicated except that the applications were doubled in amount. In this series much the highest yield followed the application of 200 lbs. each of cotton-seed meal and acid phosphate. These figures are for 1911. Another table states the 6-year average results in which the same applications were followed by the highest yields but with less distinct advantage. In another fertilizer test in 1911 the highest yields followed applications of (1) 200 lbs. of cotton-seed meal and (2) 400 lbs. of raw-rock phosphate. In a test of nitrogen sources supplemented in each case by 200 lbs. of acid phosphate the use of (1) 200 lbs. of cotton-seed meal and (2) 80 lbs. of nitrate of soda gave yields somewhat higher than those secured from the use of 150 lbs. of nitroling or 436 lbs. of ammonline. The soil used has been in cultivation more than 50 years and is characteristic of the poorer soils of the section.

IV. *Results from Delta Branch Experiment Station, G. B. Walker (pp. 27-29).*—The Express and Triumph varieties excelled the others tested in value of lint cotton per acre.

In a spacing test in which the stalks stood from 18 to 24 in. apart in the row, better yields were obtained from rows 3½ ft. apart than from rows 3, 4, 5, or 6 ft. apart.

Note on the present position of cotton investigation in India, B. COVENTRY (*Agr. Research Inst. Pusa, Bul. 26, 1911, pp. 11*).—A brief survey of the status of cotton planting, fertilizer, and cultural investigations in India.

**Flax experiments in India**, E. M. VANDERKROHVE (*Agr. Research Inst. Pers. Bul.*, 25, 1911, pp. 11, pls. 4).—This is a brief report of fertilizer and rate of sowing tests of flax at Doorlah during the year 1910-11.

**Bagged Jack Kale** (*Agr. Gaz. N. S. Wales*, 23 (1912), No. 2, p. 183).—Seed sent from the botanical gardens to the Bathurst experiment farm produced plants which ran to seed as soon as planted, presumably because of the lateness of the season. Seed sent to the Glen Innes farm, however, produced succulent plants entirely devoid of woody fiber, but did not equal white chon moellier in quality of green fodder.

**Black cats**, A. H. E. McDONALD ET AL (*Dept. Agr. N. S. Wales, Farmers' Bul.* 50, 1911, pp. 3-13).—A discussion of the wild cat (*Avena fatua*), with suggestions on its control and eradication.

**Fertilizers and the growth of rice**, J. ZAMORA (*Philippine Agr. and Forester*, 1 (1911), No. 8, pp. 152-154).—This article states the result of pot experiments with rice in which the chemically pure salts ammonium nitrate, potassium phosphate, calcium phosphate, magnesium chloride, magnesium nitrate, and magnesium sulphate were used in molecular solutions. A table states the number of leaves, date of flowering, height of plants, and number of rice grains per plant secured.

**Correlation in rye**, D. LEHN (*Illus. Landw. Ztg.*, 32 (1912), No. 3, pp. 13, 14).—The author presents figures from the records of C. Kraft, who has practiced individual selection from Zeeländer rye for 10 years.

From data for the 4-year period 1908-1911, it appears that the length of haulms varies directly with length of head, number of internodes, weight per head and per 1,000 kernels, and number of kernels per head, while it varies inversely as the weight per plant, the number of haulms, the density of head, the grain weight per plant, and the chaff percentage.

**Soy beans**, W. F. INGALLS (*Cooperstown, N. Y.* [1912], pp. 36, pls. 3).—This is a brief manual of information for the soy bean grower.

**The growth of sugar beet** (*Abstr. in Jour. Bd. Agr. [London]*, 18 (1912), No. 11, p. 343).—In a comparative test of sugar beets and mangels at 6 points in Somerset the yields were 16 and 40 tons per acre, respectively. The beets were left a little closer in the drills. Heavy manurial applications tended to depress the sugar percentage of the beets.

**Experiments on the cultivation of sugar cane at the Partabgarh Experimental Station, 1909-1911**, G. CLARKE ET AL (*Agr. Research Inst. Pusa, Bul.* 7, 1912, pp. 29, pls. 2).—This is largely made up of tables stating the results of rate of planting tests at the Partabgarh station in India during 1909-1911. The author notes that the sugar canes of upper India differ markedly from those of other countries and demand very different treatment, and that the general conclusions holding good for varieties growing in Java, the West Indies, and southern United States can not always be applied to them.

**Sweet potato investigation**, T. E. KEITT (*South Carolina Sta. Bul.* 165, pp. 3).—Previous work on the sweet potato by the station (*E. S. R.*, 25, p. 534) is reviewed, and some general information regarding the crop is presented. Determinations of sugar, glucose, and starch, and studies on the formation of sugars and starch and the content of these substances at different times of harvesting are reported, together with descriptions of the different varieties tested, fertilizer and proximate analyses of different varieties, and a report of an additional laundry test of the starch.

Determinations of samples filtered under pressure showed an average of 4.21 per cent, and samples filtered without pressure an average of 4.22 per cent, of glucose and glucose together. It was found that some changes took place in

the samples as they stood, the indication being the formation of an acid. To prevent this change, for the purpose of obtaining more accurate results, bichlorid of mercury was used as a disinfectant to arrest enzym action and fermentation, but this was also found to interfere with the accuracy of the method.

The study of the formation of the sugars and starch by analyzing samples harvested on different dates showed that on August 28, 1908, in every case, the sucrose was high and the glucose low, that the sucrose decreased and the glucose increased as the time of maturity approached, and that the total sugars and starch both decreased at the time of the most rapid development. Later the starch increased, but the total sugars continued to decrease, the water decreasing at the same time, until September 29 when the sucrose was at its lowest and the glucose generally at its highest.

Similar work was continued in 1909. The results led the author to believe that in the very immature potato the sugar may be present either as glucose or sucrose, probably depending upon the meteorological conditions. It is stated that in 1908 when the 10 days previous to the first digging were wet and cloudy, the sugar was in the form of sucrose, while in 1909 when the 10 days preceding the digging were fair, it was present almost entirely as glucose. The crop of 1908 was grown on a clay loam soil, while the 1909 crop was grown on a sandy soil.

Crop rotation and fertilizer experiments with sun-cured tobacco, W. W. GREEN (*Virginia Sta. Bul. 196, pp. 3-20, figs. 8*).—Earlier reports on these experiments, which are in cooperation with this Department, have already been noted (*E. S. R., 22, p. 137*).

The results of the crop rotation work led to the recommendation of the following 7-year rotation: Tobacco, wheat, grass, grass, corn with crimson clover as a cover crop, cowpeas, and red clover. The rotation of crops in the sun-cured tobacco district was found necessary and profitable. In connection with this rotation work it was found that seeding grass alone in August gave better results than seeding with small grain.

The fertilizer experiments showed that phosphoric acid was needed most in the soils of the sun-cured tobacco district, and that a complete fertilizer gave the best returns. Potash and nitrogen were unprofitable without phosphoric acid. The use of lime did not respond very perceptibly. Applications of cotton-seed meal made a much finer grade of tobacco than the use of nitrate of soda, but the yield was smaller. Only two-thirds as much nitrogen was found necessary when given in the form of nitrate of soda as when applied as cotton-seed meal. Heavy applications of fertilizer were found to be more profitable than light applications. The use of 1,000 lbs. of 3:8:3 fertilizer per acre gave a profit of \$40.29, while 1,800 lbs. of a home-mixed fertilizer gave a profit of \$112.17.

Growing and curing sun-cured tobacco, W. W. GREEN (*Virginia Sta. Bul. 197, pp. 3-14, figs. 6*).—Directions for growing and curing sun-cured tobacco accompany a statement of the results of a fertilizer test.

A yield of 580 lbs. of tobacco and a profit of \$38.69 followed an application of 1,000 lbs. of a ready-mixed 3:8:3 fertilizer costing \$12.50 as compared with 1,110 lbs. and \$79.92 after an application of a mixture of 1,500 lbs. cotton-seed meal, 500 lbs. of acid phosphate, and 200 lbs. of sulphate of potash per acre costing \$32.41. "This shows more than twice the net returns from the heavy application of home-mixed fertilizer" than were secured after the use of the ready-mixed fertilizer. The following wheat crop also received a marked benefit.

**Crop rotation and fertilizer experiments with bright tobacco, R. P. COCKE** (*Virginia Sta. Bul.* 198, pp. 3-20, figs. 6).—Results similar to those reported have been previously noted, with descriptions of the experiments (*E. S. R.*, 22, p. 137).

The results here reported indicate the value of using a complete fertilizer for bright tobacco. The value of the crop less the cost of the fertilizer when fertilized with nitrogen, potash, or phosphoric acid alone was \$63.43 or less per acre, while it reached \$124.54 per acre where a complete application was used. The use of 1,400 lbs. of a 3:8:3 fertilizer per acre gave a net profit of \$19.38 more than 800 lbs. of the same fertilizer, and the effects on succeeding crops were more pronounced.

The rotation recommended for 6 years is as follows: Tobacco, wheat, grass, corn with crimson clover as a cover crop, and cowpeas. An average yield of tobacco under this rotation of 1,257 lbs. per acre, having a value of \$116.98, was secured. It was found that the use of lime darkened the color of bright tobacco, showed little benefit to corn and wheat, but had a most satisfactory influence on the growth of grass.

**Wheat breeding experiments, E. G. MONTGOMERY** (*Nebraska Sta. Bul.* 125, pp. 5-16, figs. 9).—A historical sketch of wheat culture and wheat-breeding work in Nebraska is followed by a statement of the results of variety tests at the station and of tests of improved strains by farmers.

Tests of over 100 varieties already noted (*E. S. R.*, 14, p. 36) have indicated only 3 varieties that were capable of surviving Nebraska's very dry winters, and as Turkey Red excelled the other 2 varieties in milling qualities it was evidently most suitable for general cultivation. Attempts to improve it by the importation of new seed from southern Russia or from Alberta, Canada, have given negative results. Selection, however, produced strains which varied in ability to resist lodging and in shape and quantity of grain, as well as in yielding power. A table states results secured during the period 1907-1910 from 26 strains. They varied in yield from 28.88 to 40.75 bu. per acre, but it was difficult to tell by appearance the best from the poorest yielders in the field.

In 1910, 26 8-acre fields of improved strains were sown in 20 different counties of the State. The results reported by 21 experimenters showed average yields of 25.9 bu. of the improved Turkey Red as compared with 21.9 bu. of the locally grown Turkey Red. The 3 strains used in this test were Nos. 287, 425, and 48. "No. 48 has proved to be a very satisfactory yielder in comparison, and was reported as somewhat light in color." A fourth strain, No. 42, which is now ready for distribution "appears to be superior to any of the other varieties so far tested, especially in color and quality."

**Is Federation wheat degenerating? J. T. FRIDHAM** (*Agr. Gaz. N. S. Wales*, 3 (1912), No. 3, pp. 213-215).—An account is given of the occurrence of 3 mutants in Federation wheat and of the crops secured from them. Inquiry indicated that a number of other variations had been observed in this variety at the different experiment farms.

**Twenty five years' plant improvement in Sweden, N. H. NILSSON** (*Sveriges Vädesför. Tidskr.*, 21 (1911), No. 4, pp. 175-187).—This is a history and explanation of the organization and work of the Swedish Seed Improvement society.

## HORTICULTURE.

**Radium as a means of forcing plants, H. MOLICH** (*Österr. Gart. Ztg.*, 7 (1912), No. 6, pp. 197-202, figs. 3).—A summarized account of the author's experiments in the use of radium chlorid and radium emanation in forcing plants.

During the latter part of November lilac branches were successfully forced out by attaching pipettes containing a small quantity of radium chloride to the terminal buds. The forcing effect was irregular, however, since the individual buds were situated at different distances from the radiating area. Lilac branches exposed to radium emanation for periods of 20, 48, and 72 hours were successfully forced, the longer exposure giving the quicker results. Similar results were secured with chestnut branches, except that exposure to emanation for a day appeared to be sufficient. Tests were also made with branches of a number of other trees. The tulip, bladdernut, and maple were successfully forced, whereas the ginkgo, sycamore, red beech, and linden gave negative results. The experiments indicate that radium emanation will only stimulate growth during that part of the rest period between the middle of November and the end of December.

New garden plants of the year 1911 (*Roy. Bot. Gard. Kew, Bul. Misc. Inform.*, 1912, App. 3, pp. 39-64).—A list is given of garden plants described in botanical and horticultural publications during 1911. It comprises all the new introductions recorded, together with the most noteworthy of those which have been reintroduced after being lost from cultivation.

Report of the division of horticulture of the Central Agricultural Station for the year 1911, M. CALVINO (*Estac. Agr. Cent. [Mexico] Bol.* 66, 1912, pp. 82, pls. 74).—This comprises a report of varietal, climatal, and cultural experiments with forage crops, fruits, rubber trees, vegetables, ornamentals, and cereals conducted at the Central Agricultural Station.

Home gardening in South Carolina, C. C. NEWMAN (*South Carolina Sta. Bul.* 166, pp. 3-48, figs. 6).—A popular treatise presenting general considerations relative to soil and plant classification, how plants feed and grow, crop rotation, cultivation, fertilizers, hotbeds and cold frames, and giving specific directions for the culture of the important vegetables. Directions are given for controlling the more troublesome insects and fungus diseases, together with planting tables and varieties of vegetables recommended for the home garden in South Carolina.

Growing Denia onion seed, F. GARCÍA (*New Mexico Sta. Bul.* 82, pp. 27, figs. 8).—In a previous bulletin (*E. S. R.*, 22, p. 732) it was shown that the Spanish or Denia onion is well adapted for culture in certain parts of New Mexico.

Successful experiments in the production of a home supply of Denia onion seed are here reported. The seed was produced at the rate of 525 lbs. per acre in 1910 and 430 lbs. per acre in 1911. The germination tests showed 80 per cent and 81 per cent for the 2 years, respectively. The onions raised from the home-grown seed compare favorably with those from imported seed.

Impediments to the vegetable industry and their control, J. KINDEHOVEN (*Flugschr. Deut. Landw. Gesell.*, 1912, No. 13, pp. 26).—This comprises a popular treatise on the control of plant diseases, animal pests, and other drawbacks to successful vegetable growing.

Pomology (*9. Cong. Internat. Agr. Madrid*, 1911, pp. 639-715).—This comprises reports of papers presented and discussed in the pomological section of the Ninth International Congress of Agriculture, Madrid, in 1911, as follows: The Culture of Oranges, Olives, and Other Important Fruit Trees, by J. M. P. Jaramillo; a report on the same theme, by Janini; Suggestive Improvements in the Culture of Olives and the Manufacture of Olive Oil, by J. Chapelle; Methods of Defense against the Parasites and Principal Diseases of Fruit Trees, by L. Navarro; reports on the same theme, by L. Salas Amat and R. Janini; Recent Progress in the United States against Insects Destructive to Oranges, by C. L. Marlatt; and The Ink Disease in Chestnut Groves at Ardèche, by J. Farcy.

**Fruit Culture.** R. GORTHE (*Obstbau*, Berlin, 1910, pp. 174, pls. 30, figs. 77).—A practical treatise on fruit growing with special reference to German conditions. **How to grow and market fruit** (Berlin, Md. [1912], pp. 131, pls. 24).—A practical treatise on fruit culture and marketing.

**The California fruits and how to grow them**, E. J. WICKSON (*San Francisco Cal.*, 1912, 6. ed., rev., pp. 602, figs. 181).—The present edition of this treatise (E. R. S., 22, p. 734) has been revised with a view to including recent progress in various phases of the fruit industry.

**Experiments on the pollination of our hardy fruits**, C. H. HOOPER (*Irish Gard.*, 7 (1912), Nos. 76, pp. 88, 84; 77, pp. 102, 103).—A summarized account of this work has been previously noted (E. S. R., 25, p. 838).

**Orchard heating**, L. GREENE (*Iowa Sta. Bul.*, 129, pp. 131-164, figs. 16).—This bulletin reports tests conducted by the station in 3 different orchards during the season of 1911 to determine the value and efficiency of some of the orchard heating devices now on the market. Reports from individual growers in various sections of the State, who also tried out heating devices, are included and general information is given relative to methods of heating orchards.

The spring of 1911 did not offer the best conditions for a thorough test because injurious temperatures did not occur.

**How a Ventura lemon grove was protected**, C. A. TEAGUE (*Pacific Rural Press*, 83 (1912), No. 26, pp. 604, 605).—A detailed statement is given of frost fighting experience during the past season in a California lemon grove.

**New heater and vaporizer for frost protection**, A. G. MCADIE (*Mq. Weather Rev.*, 40 (1912), No. 4, pp. 618, 619).—A new heater and vaporizer being tried at the San Francisco office of the Weather Bureau is here described.

**Temperatures injurious to peaches, apples, and pears in various stages of development** (*Mo. Weather Rev.*, 40 (1912), No. 3, p. 426).—This comprises data collected under the direction of the Fruit Growers' Association of the Grand Valley, Colo., with the view of assisting growers in frost protection work.

**Tests of summer sprays on apples, peaches, etc.**, G. P. CLINTON and W. E. HARRON (*Connecticut State Sta. Rpt.*, 1911, pt. 5, pp. 347-406, pls. 8).—Tests of various Bordeaux, lime-sulphur, and miscellaneous sulphur mixtures (E. S. R., 4, p. 553) were continued on an extended scale in 1911. Lead arsenate was used, both with the mixtures and alone, as an insecticide. The details of the year's work with apples, peaches, pears, quinces, plums, cherries, and currants are reported and the results of the 2 years' work with apples and peaches are reviewed. With the results secured in the above experiments as a basis recommendations are given as to spraying practice for these fruits.

In these experiments Bordeaux has on the whole shown the best fungicidal value of any of the sprays tried. In the work with apples it was found that 3 sprayings having lead arsenate in the last 2 keep most of the fungi and insects under control. In the control of black rot on the leaves complete removal of diseased branches should be combined with spraying. The prevention of rust requires a continuous coating of the leaves from the time they first appear until all danger of infection from the cedar apple stage is over. To reduce the russeting or burning of apples that occurs with Bordeaux used alone, the authors advise using the 4:4:50 formula in the first spraying before the blossoms have opened at the critical time for scab. In the second and third sprayings a 1:4:50 formula may be used. Compared with the commercial lime-sulphur sprays, however, even weak Bordeaux is apt to produce more russeting in such susceptible varieties as Baldwin and Greening. The authors are not prepared to recommend a substitution of lime-sulphur solutions for Bordeaux.

on those varieties not seriously liable to russetting or on those very susceptible to fungus attack. The varieties which were found to be either immune or susceptible to scab, rust, sooty blotch, fruit specks, and rot are indicated. Taking all things into consideration, including the difficulty of making self-boiled lime-sulphur, this mixture appears to have no special advantage over the commercial lime-sulphurs as a fungicide for apples.

When commercial lime-sulphur is substituted for Bordeaux it should be used at the rate of  $1\frac{1}{2}$  gal. per 50 gal. of water for all 3 sprayings. For the insecticide lead arsenate at the rate of 3 lbs. of paste or  $1\frac{1}{2}$  lbs. of powder per 50 gal. of mixture may be added in the last 2 sprayings. The treatment recommended for the pear and quince is similar to that for the apple. For peaches, cherries, and plums, where there is always danger of burning from Bordeaux and also often from commercial lime-sulphurs, especially if used with lead arsenate, self-boiled lime-sulphur appears to be the best fungicide since it produces on the whole the least injury of any spray tried. The 8:8:50 formula for all 3 sprayings has given the best results.

In the 2 years' work with peaches lead arsenate has done little to prevent the attacks of curculio, and since it seems to increase the danger of spray injury when combined with lime-sulphur, the authors advise leaving it out unless there is considerable danger from sawfly injury, when it can be added in the second spraying as with apples.

Orchard spraying experiments, W. W. BONNS (*Maine Sta. Bul. 198, pp. 32, pls. 5*).—Spraying experiments were continued at the Highmoor Farm in 1911 (*E. S. R.*, 25, p. 538), and cooperative experiments were conducted in 3 nearby orchards. The formulas used in the Highmoor experiments included lead arsenate at the rates of 2 lbs. and 4 lbs. to 50 gal. of water, lime-sulphur at the rates of  $1\frac{1}{2}$ ,  $1\frac{3}{4}$ , and 2 lbs. to 50 gal. of water, plus 2 lbs. of lead arsenate in each case, and Bordeaux mixture 3:8:50 plus 2 lbs. of lead arsenate. The results are presented in detail and discussed.

Seasonal conditions combined with other inhibitive factors were unfavorable for the development of fungus and insect injury to any practical degree, hence no valuable data for estimating the fungicidal or insecticidal value of the sprays were secured. In the case of fruit russetting none of the percentages from any plats were high and all so nearly alike that no deductions were warranted. The relation of lime-sulphur injury to strength of solution was not indicated in any way.

In view of observations made in 1911 the author is now inclined to the opinion that calyx injury, which was found quite generally on fruit sprayed with lime-sulphur in 1910, may be due as much to lack of vigor in the tree as indicated by the tissues of the fruit, as to the caustic action of the spray.

A form of injury known as sunscald was produced by sunlight on fruit directly exposed to the sun upon the southern sides of trees. The sunscald appeared as discolored sunken spots or maculations with a sharply defined margin. Spraying during hot weather appeared to increase the severity of sunscald where injured areas were present before the last spray was applied. Also the amount of scald, though relatively small, varied directly with the strength of lime-sulphur used. Injury on the lead-arsenate plats was less in amount but qualitatively equally serious. Scald injury on the Bordeaux plats was very slight.

Aside from fruit russetting a large percentage of the apples on the Bordeaux plat showed more or less Bordeaux injury, the fruit appearing to be either well mottled with dull-brown flecks a few millimeters in diameter or speckled with minute dots. This gave to the fruit a general soiled dull-brown hue. The coloring of the fruit from this plat was far below that of the apples on any of

the others, whereas the fruit of the other experimental plats, benefited by the rains of late summer and the long period of sunshine, grew to unusual size and was of exceptionally high quality and color. The development of Bordeaux injury appears to have coincided with a period of rainy weather.

From the results of the experiments as a whole the author concludes that spray injury may be, and very likely is, due as much to a physical factor, i. e., the application of a mist or spray to growing plant tissues under extreme, or some now undetermined, but unfavorable, meteorological conditions, as to any chemical action of the material used.

**Analyses of materials sold as insecticides and fungicides** (*New York State Sta. Bul. 348*, pp. 85-98).—Analyses are reported of Paris green, lead arsenate, Bordeaux lead arsenate, Bordeaux mixture, Bordeaux-Paris green mixtures, lime-sulphur solutions, mixtures of soluble sulphur and oils, nicotine preparations, soap solutions, sulphur, and hellebore.

**The precooling of fruit in the United States**, S. J. DENNIS (*Ber. II. Internat. Kältenkong. Wien*, 5 (1910), pp. 434-456, figs. 8).—A paper on this subject read before the Second International Refrigeration Congress, held at Vienna in 1910.

**Refrigeration in relation to fruit growing in Canada**, J. A. RUDNICK (*Ann. Rpt. Fruit Growers' Assoc. Nova Scotia*, 48 (1912), pp. 33-42).—In this paper the author points out some of the possibilities of cold storage in relation to the fruit industry.

**Breeding citrus trees**, A. D. SHAMEL (*Pacific Rural Press*, 83 (1912), No. 25, p. 587).—An abstract of a paper read before the California State Fruit Growers' Convention at Santa Barbara.

In his study of bud selection with citrus fruits (*E. S. R.*, 24, p. 737), the author finds frequent variation in type of tree and fruit such as would come under the heading of bud sports or so-called bud mutation. A study of one grove of Washington navel oranges of about 150 acres revealed the presence of 7 frequently occurring types, 5 of which are unproductive, bearing low-grade undesirable and unprofitable fruit. All of the trees of this grove were propagated from the 2 parent Washington navel trees in Riverside. Similar variations were found in grapefruit and lemons. The frequency and general prevalence of bud sports in the Valencia orange is much greater than in any citrus variety yet studied.

The trees have been found to vary consistently, not only in striking typical differences, but in the amount of production within the type. About 10 per cent of standard type trees studied are consistent producers of the highest grades of fruit and free from any evidence of bud sports. The author calls attention to the successful results secured by G. T. Powell from the practice of careful bud selection (*E. S. R.*, 19, p. 1142), and offers a general conclusion that a careful study of bud variation and bud selection will prove of great benefit to the growers of all plants propagated by budding.

**Work for citrus improvement**, J. E. CORR (*Pacific Rural Press*, 84 (1912), No. 1, pp. 5, 6).—This comprises a brief sketch of the plan of development of the work of the California Citrus Substation.

**Viticulture** (*9. Cong. Internat. Agr. Madrid*, 1911, pp. 587-637).—This comprises the following papers presented and discussed in the viticultural section of the Ninth International Congress of Agriculture, Madrid, 1911: Grape Stocks Adapted to Dry and Limy Soils, by N. García de los Salmones (*E. S. R.*, 1, p. 145); The Grape Stocks in Dry and Limy Soils, by P. Gervais; and New Uses in the Utilization of Musts and Wines, by C. Mestre Artiga.

[Report of the viticultural branch], M. BLYNNNO (*Rpt. Dept. Agr. N. S. Wales*, 1911, pp. 60-64).—This report is largely a review of the work of recon-



substituting phylloxera-infested vineyards with resistant stocks, together with a review of the 1911 vintage and enochemical analysis.

A new process of grafting American grapes, P. HUNERT (*Möller's Deut. Gärt. Ztg.*, 27 (1912), No. 24, pp. 277, 278, figs. 2).—The method described consists of the use of a plaster of Paris bandage around the union and rooting the grafted cuttings without artificial heat.

Making a rock garden, H. S. ADAMS (*New York*, 1912, pp. 52, pls. 8, figs. 6).—A short treatise on the details of constructing and plant materials for rock, wall, water, and bog gardens.

Making a garden to bloom this year, GRACE TABOR (*New York*, 1912, pp. 54, pls. 8, fig. 1).—A popular discussion of plant material for quick effects.

### FORESTRY.

Illustrated key to the wild and commonly cultivated trees of the northeastern United States and adjacent Canada, based primarily upon leaf characters, J. F. COLLINS and H. W. PRESTON (*New York*, 1912, pp. VII+181, figs. 279).—The authors' Key to New England Trees (*E. S. R.*, 21, p. 241) has been extended in the present handbook to include the northeastern States and adjacent Canada. Illustrations showing an outline of a typical leaf of every tree of which the leaves differ sufficiently to be easily recognized have also been included.

Key to the wild and cultivated trees in autumn, C. A. DARLING (*Torrey's*, 12 (1912), No. 7, pp. 155-164).—This key is designed to be used in the field to determine the trees to be found growing in the eastern United States.

The seedlings of the live oak and white oak, W. C. COKEE (*Jour. Elisha Mitchell Sci. Soc.*, 28 (1912), No. 1, pp. 34-41, pls. 2).—A comparative study of the seedling structure of live and white oaks, with special reference to the tuberous formations of the roots of live oak seedlings.

Tulipwoods and tulip trees, W. DALLIMORE (*Roy. Bot. Gard. Kew, Bul. Misc. Inform.*, 1912, No. 5, pp. 241-245).—Descriptive accounts are given of a number of woods which are commonly classed as tulipwood.

Eucalyptus, its history, growth, and utilization, C. H. SELLERS (*Sacramento, Cal.*, 1910, pp. 93, figs. 35).—This is a treatise on eucalyptus culture, based largely on data secured from various groves in California. Information is given relative to the soil and climatic requirements, adaptability of species for given localities, time and method of planting, and subsequent care and management. Considerable data are also given relative to the rate of growth, yield, and utilization of the different species.

Camphor from *Cinnamomum camphora*; cultivation and preparation in the Federated Malay States, B. J. EATON (*Dept. Agr. Fed. Malay States Bul.*, 15, 1912, pp. 38, pl. 1).—In addition to a description of the experiments carried out in the Federated Malay States Agricultural Department, a summary is given of experiments conducted in other countries, together with a résumé of the present condition of the industry.

[Rubber tapping experiments], H. NEWPORT (*Ann. Rpt. Dept. Agr. and Stock [Queensland]*, 1909-10, pp. 67-74).—This comprises a detailed statement of experiments in tapping Para rubber, together with estimates of the cost of establishing, upkeep, and the profits to be derived from a Para rubber plantation.

The woodlot for central Indiana, E. C. PRUEG and M. B. THOMAS (*Proc. Ind. Acad. Sci.*, 1909, pp. 419-439, figs. 4).—This paper describes the condition of central Indiana woodlots and makes suggestions for their improvement and perpetuation.

**Wood-using industries and National Forests of Arkansas** (*U. S. Dept. Agr., Forest Serv. Bul. 106, pp. 40*).—This is a 2-part bulletin dealing with the forest products and resources of Arkansas.

**Part I. Uses and supply of wood in Arkansas**, J. T. Harris and H. Maxwell (pp. 7-26).—This comprises a statistical account of that part of the sawmill output which passes through further processes of manufacture in the State. Tabular data are given showing the amount of such wood consumed annually in Arkansas by species and industries, together with the cost and the percentage grown in and out of the State. The various woods included are briefly described.

**Part II. Timber resources of the National Forests in Arkansas**, F. Kiefer (pp. 27-36).—This describes the various kinds of timber on the National Forests and the means of purchasing it.

Grades and specifications of rough stock and squares employed in making special hardwood products for factory use, together with a summary of uses of wood by Arkansas manufacturers are appended to the bulletin.

**Forest products of Canada, 1911.**—Pulpwood, H. R. MacMILLAN, E. G. McDougall, and W. G. H. Boyce (*Dept. Int. Canada, Forestry Branch Bul. 30, 1912, pp. 17, figs. 3*).—A statistical account of the quantity and value of the pulp wood produced in Canada, reported by species, Provinces, and processes. Data are also given showing the pulp exported from the Dominion, together with the pulp wood exported from the various Provinces in a manufactured state. The 54 firms reporting used 672,238 cords in 1911 and 847,939 cords were exported in the raw state.

**Strength tests of cross-arms**, T. R. C. Wilson (*U. S. Dept. Agr., Forest Serv. Circ. 204, pp. 15, figs. 2*).—This circular describes tests of Douglas fir, shortleaf pine, longleaf pine, and southern white cedar cross-arms, conducted at the Forest Products Laboratory, Madison, Wis.

The average maximum load borne by the various species and grades ranged from 10,180 lbs. for longleaf pine with 75 per cent heartwood to 5,200 lbs. for white cedar, the weakest wood used. Inasmuch as the poles have not withstood an average side pull of much more than 3,000 lbs., all of the woods tested are considered sufficiently strong to be used for cross-arms.

**The preservation of mine timbers**, E. W. PETERS (*U. S. Dept. Agr., Forest Serv. Bul. 107, pp. 27, pls. 4, figs. 7*).—Experiments conducted cooperatively by the Forest Service and various mining companies throughout the United States to secure authentic data on the efficiency of various methods of preserving mine timbers from decay, in continuation of previous work (*E. S. R.*, 19, p. 545), are here reported. The work is discussed under the general headings of agencies destructive to mine timbers, practical methods of increasing the durability of timber, results of experimental treatments, cost of treatment, durability of treated timbers, economy in the use of treated timber, and the avoidance of waste. Analyses of preservatives are appended.

Decay was found to be the agency most destructive to timber used in mines. Although this may often be retarded by peeling and seasoning, treatment with a suitable preservative is more effective. Mine timbers impregnated with zinc chlorid and creosote oils have shown the best results. Green, unpeeled, and untreated loblolly pine gangway sets lasted less than 1½ years. Brush treatments with creosote and carbollinuum increased the average life about 3 or 4 years, while impregnation treatments with zinc chlorid and creosote left from 70 to 90 per cent of the timbers sound at the end of 4 years. Either the brush treatment, the open tank process, or the pressure process may be used in treating mine timbers, the method employed depending on the amount of material to be treated.

**Silviculture** (9. Cong. Internat. Agr. Madrid, 1911, pp. 507-536).—This comprises the following papers on reforestation presented and discussed in the silvicultural section of the Ninth International Congress of Agriculture, Madrid, 1911: Reforestation, Its Advantages and Methods Affecting It, by C. de Campe; Reforestation, by Daubrée; The Problem of Reforestation in the Mediterranean Basin, by R. Hickel; Value of Reforestation and Methods of Accomplishing It, by P. Descombes; The Work of Official Corporations, Societies, and Individuals in Connection with Reforestation in Spain, by R. Codornid; Principles of Reforestation in Denmark, by C. Dalgas; Value of Reforestation and Methods of Accomplishing It, by A. Mendès d'Almeida; Reforestation, by M. L. de Villmorin; and Protection and Surveillance of Trees, by Fuensanta de Palma.

On the influence of various degrees of light and extreme temperatures upon the germination of forest seed, G. PITTAUER (*Centbl. Gesam. Forstw.*, 38 (1912), Nos. 4, pp. 157-172; 5, pp. 213-224, figs. 2).—Experiments conducted with spruce, larch, white, black, and Weymouth pine, locust, and red beech seeds are reported in detail.

The selection strip-felling and its system, C. WAGNER (*Der Blendersaumschlag und sein System. Tübingen, 1912, pp. XII+368, pls. 2, figs. 75*).—A treatise on forestry in which the author sets forth a system of forest management based on the selection strip method of felling discussed in his previous work, *The Principles of Spatial Arrangements in Forests* (E. S. R., 20, p. 645).

The lightning danger of various trees, E. STAHL (*Die Blitzgefährdung der Verschiedenen Baumarten. Jena, 1912, pp. 75*).—This comprises an examination of both scientific and popular literature dealing with the value of various tree species as lightning conductors.

Summing up the evidence as a whole it does not appear that trees are of material value as lightning conductors near buildings or that they are sufficiently dangerous to be abolished from the vicinity of a building. A comparative study of the characteristics of those trees which have been reported most dangerous and those which have been reported least dangerous shows a tendency for certain trees to become quickly wet from top to bottom during an ordinary thunder shower. To this class of trees, which forms the best lightning conductors, belong the apple, cherry, nut trees, beeches, horse chestnut, hornbeam, maple, and sycamore. The greatest loss of life and damage to property has been caused by such trees as spruce, firs, larches, poplars, willows, elms, lindens, ash, pear tree, and oaks.

Forest fire protection under the Weeks law in cooperation with States, J. G. PEREIRA (*U. S. Dept. Agr., Forest Serv. Circ. 205, pp. 15, fig. 1*).—This circular explains the nature of the aid rendered by the Forest Service of this Department under section 2 of the Weeks law (E. S. R., 24, p. 498), which section authorizes the Secretary of Agriculture to cooperate with States in protecting from fire the forested watersheds of navigable streams.

A review is given of the work done in 1911, together with the results accomplished. The form of agreement for cooperative work, together with a sample fire plan map of the northern district of New Hampshire, is appended.

Eighth annual report of the state forester of Massachusetts, F. W. RANK (*Ann. Rpt. State Forester Mass., 8 (1911), pp. 154, pls. 8, figs. 3*).—Introductory considerations deal with the organization and staff of the forestry department. Part I reviews the general forest operations for the year, including the examinations of woodland and assistance rendered to owners, reforestation and forest nursery work, forest fires and methods of control, progress of the chestnut bark disease in Massachusetts, a sketch showing a proposed cure for the lumbering slash evil, numerous addresses and lectures delivered by the state for-

act, and new forestry legislation, together with a financial statement for the year. The state-wide forest fire organization, headed by a state warden, was perfected during the year.

Part 2 of this report, which records the year's progress in the suppression of the gipsy and brown-tail moths, is noted on page 455 of this issue.

Progress report of forest administration in the Andamans for 1910-11, H. A. FARRINGTON (*Rpt. Forest Admin. Andamans, 1910-11, pp. IV+34*).—This comprises a review of the administration of the state forests of the Andamans, including a financial statement for the year 1910-11. The more important data relative to areas, surveys, protection and miscellaneous forest work, revenues, expenditures, etc., are given in appendices.

## DISEASES OF PLANTS.

Four new fungus diseases in Iowa, L. H. PAMMEL and CHARLOTTE M. KING (*Iowa Sta. Bul. 131, pp. 199-221, figs. 14*).—Notes are given on timothy rust (*Puccinia phlei-pratensis*), alfalfa rust (*Uromyces striatus*), blister canker of the apple (*Nummularia discreta*), and onion smut (*Urocystis cepulae*). The different fungi and their methods of attack are described, and accounts are given on the distribution of the diseases and the relation of the fungus to the host plant, together with suggestions for their control. A bibliography is appended.

Notes on fungus diseases, J. C. MOORE (*Rpts. Bot. Sta. [etc.] St. Lucia, 1910-11, pp. 6, 7*).—Brief accounts are given of diseases affecting a number of economic plants, among them the root disease, which attacks cacao, breadfruit, avocados, and other trees; the pink disease of guavas, due to a fungus which has been identified as *Corticium lavei*; and a fungus disease of lime branches, which is caused by attacks of *Thelephora pedicellata*.

Fungi exotici: XIII, G. MASSEE (*Roy. Bot. Gard. Kew, Bul. Misc. Inform., 1912, No. 4, pp. 189-191*).—The author describes a number of species of fungi, two of which are considered to be injurious parasites. These are *Pheangella kecoa*, which is found on the bark of the young *Hevea* rubber trees in Southern Nigeria, and *Colletotrichum necator*, which is said to cause the fruit of peppers to become blackened and shriveled. Technical descriptions of the different species are given.

The seed treatment of summer grains, L. HILTNER (*Prakt. Bl. Pflanzenbau u. Schutz, n. ser., 10 (1912), No. 2-3, pp. 23-26*).—The author recommends treating oats, barley, and wheat with a 0.1 per cent solution of formalin for the prevention of loose smut of oats, stinking smut of wheat, and barley smut due to *Ustilago hordei*. Other efficient treatments recommended are the use of Sublimoform and Cuproform, combinations of corrosive sublimate and formalin and copper sulphate and formalin. For the treatment of rye a weak solution of corrosive sublimate is preferred. For combating loose smut of wheat and barley chemical treatments can not be recommended, but the modified hot-water treatment is said to be very efficient.

Control of grain smuts, JOHANNA WESTERDIJK (*Cultura, 23 (1911), No. 230, p. 558-598*).—This is a discussion of the present state of the information regarding combating of smut in grains, and of the recent literature on the subject. Attention is given more particularly to the contributions of O. Appel and E. Rheim (*M. S. R., 23, p. 546*) on the treatment with hot air and hot water under conditions claimed by them to produce the best results. The author states that this treatment has already been successfully employed in the Netherlands.

**Cotton anthracnose, H. W. BARRÉ** (*South Carolina Sta. Circ. 1*, pp. 3).—This circular gives a survey of the situation in South Carolina in relation to the cotton anthracnose, describes the symptoms of the disease and methods for combating it, and requests information from planters in relation to various factors of distribution and control.

**Cotton anthracnose, H. W. BARRÉ** (*South Carolina Sta. Bul. 164*, pp. 22, pl. 1, figs. 6).—The author has for a number of years been conducting investigations on cotton anthracnose, the technical results of which have been published in the reports of the station (E. S. R., 26, p. 647). The present bulletin brings together in a nontechnical form the information gained to date. The author shows that the disease is spread principally by infected seed and that the fungus retains its vitality in diseased seed for probably 2 years or more. In the field the fungus does not remain alive for more than 1 year. It is claimed that crop rotation and seed selection will control this disease, which is widely spread and very destructive.

**Investigations on potato diseases (third report), G. H. PETHYBRIDGE** (*Dept. Agr. and Tech. Instr. Ireland Jour.*, 12 (1912), No. 2, pp. 334-359, pls. 3).—This report gives an account of further studies on various diseases of the potato and means for their control (E. S. R., 25, p. 454). Among the diseases investigated were the ordinary potato blight, sclerotium disease, black stalk rot, corky or powdery scab, leaf curl, leaf roll, sprain, and a new form of potato rot.

In spraying experiments for the potato blight due to *Phytophthora infestans*, Burgundy mixture, Bordeaux mixture, and lime-sulphur solution were compared. On account of the difficulty of obtaining good lime the Burgundy mixture is given preference over Bordeaux mixture. The lime-sulphur solution was found practically useless in warding off potato blight.

For the sclerotium disease, due to *Sclerotinia sclerotiorum*, no efficient method of treatment has been found, though spraying and cultural methods were tested.

The effect of heating tubers infected with the organism of the black stalk disease (*Bacillus melanogenes*) for 4 hours at 50° C. was tested but without any striking results. When the tubers were subjected to lower temperatures the rot seemed to be accentuated.

The author definitely establishes the fact that *Spongospora subterranea*, the cause of the corky or powdery scab, produces galls on the roots of the potato plant. Soil fungicides were found to reduce the injury due to this organism. Attention is called to the differences between leaf curl and leaf roll of the potato.

A new tuber rot was investigated which the author states can not be classed as a wet or a dry rot, as it does not exhibit the characteristics of either. The disease occurs in a number of regions in Ireland. It attacks the larger tubers and may cause serious losses in the crop. A study of material demonstrated that it was not due to bacteria, while a fungus was isolated from some of the diseased tubers which is believed to be the cause of the rot. The fungus resembles *P. omnivora*. This form of tuber rot is to be investigated further.

**The Alternaria blight of ginseng, H. H. WRETZEL** (*Spec. Crops, n. ser.*, 11 (1912), No. 117, pp. 91-95).—The Alternaria blight, due to *A. panax*, is said to be the most common, widespread, and best known disease of ginseng. It is reported as occurring quite widely throughout the United States, practically in every region where the plant is grown. The symptoms of the disease and the life history of the parasite are described at some length and suggestions given for its control.

According to the author, great care should be exercised to exclude the fungus from the ginseng garden, as its eradication after once becoming established is

practically impossible. The use of a 3:3:50 Bordeaux mixture has proved beneficial both in laboratory tests and when sprayed upon plants. Lime sulphur, which has been tested as a possible substitute for Bordeaux mixture, appeared to be injurious when applied at a strength sufficient to kill the spores of the fungus.

Leaf-roll disease of potatoes, IV, O. REITMAIR (*Ztschr. Landw. Versuchs. Österr.*, 15 (1912), No. 1, pp. 1-106).—This is the fourth report by the committee on the study of this disease (E. S. R., 27, p. 351), the principal conclusions in which are as follows:

The primary potato leaf-roll disease entails on the plants alterations which affect both plant and tuber, and tend toward a rapid deterioration of the stock. This deterioration through successive generations is accelerated by unfavorable life conditions, but it may be checked or for a time reversed in part by very favorable treatment, the plants meanwhile showing improvement as regards plant development and crop production. Deterioration under favorable conditions is very gradual, but the investigators are not able to report any means of permanently checking the advance of the disease when once established. The question as to whether plants descended from those showing the primary stage of leaf-roll disease are more susceptible to new disease influences is regarded as still unsettled.

The outward indications of deterioration show in varying degree with different varieties of potatoes. Among the sorts now common *Magnum Bonum* seems to most readily acquire this disease. With this variety the investigators were unable even by selection to check the decline of the stock.

The size of the tubers is said to be no criterion of freedom from this disease or of desirability in other respects for seeding purposes.

Observations do not appear to bear out the assumption that inheritance of the disease through the tubers is due to an organism. It appears that along with one primary stage two secondary stages occur, viz, a fungus-free stage resulting from simple inheritance and a fungus-bearing form due to repeated infection. The authors were not able by any treatment of the potatoes to produce therein the characteristic symptoms of the leaf-roll disease.

Leaf roll of potato, G. KÖCK and K. KORNAUTH (*Ztschr. Landw. Versuchs. Österr.*, 15 (1912), No. 3, pp. 179-237, fig. 1).—This is the fifth report of the committee (see above) and includes studies carried on by the authors for about 3 years on different varieties of potatoes.

Potato leaf roll is held to be a parasitic disease, apparently caused by a fungus of the genus *Fusarium*. This vegetates in the plant attacked, causing the first stage of the disease. Early in its course this fungus may pass into the newly formed tubers or else, through its weakening influence on the aerial portions of the plant, simply produce a crop diminished in size and number of tubers. Subsequent crops produced from these infected or simply lightened or weakened potatoes will show the fungus-bearing or the fungus-free forms, respectively, of the secondary stage of the disease. It was not found practicable to estimate the intensity of the infection with any accuracy from the effect on the crop.

The variety *Magnum Bonum* is said to be very susceptible to the disease, and the deterioration through the successive generations was in this case exceptionally rapid. However, it is considered not to have been conclusively shown that careful selection and favorable treatment on uninfected soil may not check the decline and even show actual improvement.

An important rôle is thought to be played by the soil in the transmission of this disease from the old to the new plants. The question as to the duration of the danger period as regards soil infection and that as to the possibility of limiting or preventing such infection are regarded as still unsettled.

The authors append to this report of their own investigations brief abstracts of a long list of contributions made by others on the subject of potato leaf-roll disease in 1911.

**Experiments with Bordeaux mixture as a cane dip, A. H. ROSENFELD (Internat. Sugar Jour., 14 (1912), No. 161, pp. 255-263).**—The author describes experiments in dipping sugar cane in Bordeaux mixture for the prevention of diseases, and also the effect of the fungicide on the germination and growth of the plants. The experiments were divided into 2 series in which normal strength and double strength Bordeaux mixture was used, one lot of seed cane in each series being left in the solution for 1 hour and the other lot soaked for 24 hours. The cane was planted and observations made on its germination and subsequent growth from time to time.

Inspection showed that cane which had been dipped for 1 hour in the Bordeaux mixture gave better results than the untreated lot, while that which had been soaked for 24 hours in the fungicide gave yields less than the checks. The smallest number of stalks per row was obtained from the lot dipped for 24 hours in double strength Bordeaux mixture.

**Fruit trees and black spot canker, J. P. CARPENTER (Brit. Columbia Dept. Agr. Bul. 34, 1911, pp. 14, figs. 5).**—This disease, known also under the names anthracnose, sour sap, etc., in British Columbia since 1901 and in neighboring portions of the United States 10 years earlier, is here described, and the comparative susceptibility of several varieties of trees is discussed.

The disease is said to be due to a parasitic fungus, called *Macrophoma curvispora* by Beck and *Glaeosporium malicorticis* by Cordley. Spore-bearing pustules on the surface mark the course but not the full progress of the disease. The fungus may enter apparently without previous breaches in the bark, but is favored by such injury and spreads in the cambium layer and later in the bark to a corresponding extent, producing broad, deep, and sometimes incurable wounds, sapping the vitality of the trees, killing branches, stunting growth, and materially decreasing crop returns. The spores are contained in a gelatinous mass which dissolves in water, permitting their escape, but not to any very great extent until wet weather furnishes favorable conditions, usually after the appearance of the autumn rains. It seems that infection occurs most freely during November and December.

For control of this disease, comparative dryness and freedom from injury are desirable. Proper elevation, drainage, spacing, pruning, and care in cultivation are insisted upon. To prevent infection of the trees by spores when present, Bordeaux mixture or lime-sulphur wash is recommended. The spraying should be done once early in the fall before the rains set in, and repeated just after the fall of the leaves.

**A new canker-producing fungus, A. POTEBNIA (Zitschr. Pflanzenkrank., 22 (1912), No. 3, pp. 129-148, pls. 3).**—A disease of *Pyrus paradisiaca* was investigated by the author and by him attributed to the activity of a fungus formerly known under the name *Phacidium discolor* but by the author classed as a new genus and named *Phacidiella discolor*. A detailed discussion is given of the forms, habits, relationships, and ravages of this fungus, which is found on both dry and living twigs of several species of *Pyrus*, having been noted at Kharkov, Russia, and at Liege, Belgium.

**Diseases of raspberry and loganberry (Jour. Bd. Agr. [London], 19 (1912), No. 2, pp. 124-126, pl. 1).**—A description is given of *Hendersonia rubi*, which is responsible for serious injury to raspberries and loganberries, and *Ascochyta pallor*, which occurs as a parasite of raspberries, roses, etc.

The first fungus attacks the stems during the summer when the young growth is tender, and as a rule lurid red or purplish patches appear on the stem.

When several diseased areas are present the canes are killed outright during the winter, whereas when only one or two infected areas are present the canes may survive and produce a certain amount of fruit. Infection mostly takes place during the fruiting period, hence spraying can not be successfully resorted to unless the fruit is sacrificed. If spraying is found desirable the use of Bordeaux mixture is recommended. All diseased canes should be cut out and burned as soon as noticed, and the practice of allowing dead canes to remain standing throughout the winter is condemned.

The second fungus forms white patches on the stems, studded with black dot-like fruits. For the control of this parasite, treatment similar to that suggested for *H. rubi* is recommended.

Invasions of downy mildew in southwest France in 1911, J. CAPUS (*Rev. Vit.*, 37 (1912), No. 958, pp. 568-571).—A detailed account is given of the author's observations made on the 7 outbreaks and the progress of grape mildew in the vineyards of Gironde from June to September, 1911.

Conditions for development of downy mildew.—Temperature, L. RAVAZ and G. VESOE (*Prog. Agr. et Vit. (Ed. l'Est-Centre)*, 33 (1912), No. 16, pp. 485-489).—The authors report on a continuation of their studies (*E. S. R.*, 27, p. 49).

Both young and mature leaves of grapes were inoculated at from 7 to 14° C. with spores in a very moist atmosphere, the controls ranging from 18 to 35°. It was found that the inoculations at temperatures down to 8° showed conidia-spores in from 4 to 5 days, but those at 7° failed to develop the infection.

Experiments to determine the danger period from possible infection were also carried out under varied conditions. Conidia on glass plates in a very moist atmosphere under bell jars at from 17 to 27° failed to germinate, as did all of those placed in water. Those placed on the upper surface of leaves, kept at from 15 to 32° temperature and from 55 to 85 per cent of humidity, showed no germination in 6 days; but spores placed on a watch glass under a bell jar in a very moist atmosphere at from 20 to 35° and watered every 2 to 7 hours germinated in from 2 to 4 days, but after 6 or 7 days no further germination occurred. It is inferred from these tests that the power of germination is retained for about 5 days under conditions favorable to germination, but that it is lost very quickly in a less moist atmosphere, supposedly because of desiccation; that it is the occurrence simultaneously of favorable conditions of temperature and moisture that is to be feared; and that it is at such times that treatment should be employed.

Infection experiments with mildew in Hungary, P. LARUE (*Rev. Vit.*, 37 (1912), No. 954, pp. 416-418).—A résumé of an article already noted (*E. S. R.*, 7, p. 47).

Anatomo-pathological investigations on roncet, A. BIASCO (*Ann. R. Scuola Sup. Agr. Portici*, 2, ser., 9 (1909), Art. 15, pp. 1-9).—A brief account is given of the anatomical alterations marking the progress of this disease.

The Panama disease of bananas (*Agr. News [Barbados]*, 11 (1912), Nos. 60, pp. 126, 127; 261, pp. 142, 143).—This gives a summary of knowledge relating to some of the diseases of the banana and particularly that known as the Panama disease.

It is thought that there are probably two distinct diseases which affect the vascular bundles, and therefore the water supply, of certain varieties of plantains and bananas. The first is the Moko disease, which is attributed to *Colletotrichum musae*, while the second is designated as the Surinam Panama disease, used by *Leptotheca musae*. In addition it is stated that possibly the Panama disease of Central America is distinct from the above.



**Diseases of vanilla, C. MAUBLANC** (*Agr. Prat. Pays Chauds*, 12 (1912), Nos. 108, pp. 177-188, figs. 2; 109, pp. 277-287, figs. 4).—The author describes a number of fungus diseases of vanilla, among them anthracnose due to *Calospora vanilla*, brown spotting of the stems caused by *Nectria vanilla*, rust caused by *Uredo scabies*, leaf spots caused by *Fusicladium vanilla*, *Phyllosticta vanilla*, *Americosporium vanilla*, and *Ocellaria vanilla*, and attacks by *Seurattia coffeicola*, *S. vanilla*, and *Cephaeleuros henningsii*.

**Notes upon tree diseases in the eastern States, P. SPAULDING** (*Mycologia*, 4 (1912), No. 3, pp. 148-151; abs. in *Phytopathology*, 2 (1912), No. 2, p. 93).—The author describes a number of diseases of forest trees in the eastern United States. Notes are given on the distribution of the chestnut blight to the North, South, and West.

A serious disease of balsam fir, caused by *Lophodermium nervisequum*, is noted as occurring in the Adirondack region. It causes the death of much young growth. Infection occurs in June, the fruiting bodies being formed on the same needles about a year later.

An apparently serious disease of maple, caused by *Myxosporium acerinum*, is described. The disease is said to be widespread and affects the smaller branches. Cutting out and burning the affected branches seems to be the only practical method of treatment.

A disease of Norway and other spruces, due to *Phoma piceana*, which results in the defoliation and death of trees, is described.

**Fungus root rot, W. T. HORNE** (*Mo. Bul. Cgm. Hort. Cal.*, 1 (1912), No. 8, pp. 216-225, figs. 7).—This disease, known also as oak fungus, toadstool disease, etc., and ascribed to the activity of *Armillaria mellea* (other fungi possibly also participating), is said to affect a great variety of trees which are woody and long lived and to be much more abundant than is commonly supposed. It works in areas which tend to enlarge from year to year, revealing its presence by large light brown toadstools beside or around the diseased trees, usually during November and December, and arising from decayed roots of some size deep below the surface of the ground. Immense numbers of spores are produced but these do not seem to spread the disease so actively as do the diseased roots. From their subterranean mycelium often arise shiny black cord-like strands which are able to penetrate the soil for several inches or more and attack healthy roots when reached, thus starting new lines of propagation. The mycelium also spreads upward into a somewhat fan-shaped growth, forming a felt white body within the bark of the trees affected. This white mass crowds directly into the perfectly healthy living portion, with the result that this puffs up and becomes watery and often filled with gummy or gelatinous material. The advance of the mycelium is favored by moisture and tends to cause a very complete white rot of the wood.

It is said to be well to dig and dry the toadstools before they pass beyond the button stage and mature their spores, also to dig and burn or dry the diseased roots, which are almost always of the larger size. The land should then be planted to annual crops not attacked by fungus for a sufficient time to allow the old roots with their mycelium to disappear, or else after a time with trees more or less immune, as pears, black walnuts, figs, cherries, etc. Experiments intending to check the spread along diseased roots, as by uprooting a zone of sound trees, placing a wall of tarred paper around the infected area, etc., have been attempted with varying expense and success.

**The fungus of the chestnut tree blight, W. G. FARLOW** (*Science*, n. ser., 35 (1912), No. 906, pp. 717-722).—A discussion is presented relating to the

identity of the fungus which is held to cause the blight of the chestnut tree. The author states that so far as can be distinguished by the morphological characters, *Diaporthe parasitica* as described by Murrill (E. S. R., 19, p. 231) resembles the Italian *Endothia radicalis* so closely that they can not be separated specifically unless it be by some peculiarity not hitherto recorded.

A twig disease of elms, J. ERIKSSON (Mycol. Centbl., 1 (1912), No. 2, pp. 35-42, pl. 1, figs. 3).—The author describes a disease found on *Ulmus montana*, *U. montana caoniensis*, *U. campestris*, and *U. effusa*, which usually attacks the younger shoots and plants, dotting the surface with small black pustules and finally killing the affected parts or plants.

The disease is ascribed to a fungus found in connection therewith. This is claimed to be new and is described under the name *Exosporium ulmi*. Attempts with artificial inoculation were successful in several instances, reproducing the characteristic symptoms of the disease and killing the infected twigs or young plants. As protection against this disease the author recommends careful inspection of nursery stock before purchase and repeated examination of suspected trees with removal and destruction by fire of all dead or visibly infected twigs.

Fungus enemies of Canada poplar in Santena, P. VOGLINO (Ann. R. Accad. Agr. Torino, 53 (1910), pp. 325-377, figs. 4).—Descriptions are given of 33 species of fungi and bacteria known to infest Canada poplar in Italy.

Hevea rubber stumps as possible carriers of disease (Agr. News [Barbados], 11 (1912), No. 262, p. 158).—Attention is called to the statement of Stockdale that imported Para rubber stumps showed the presence of fungi, and a warning given against their indiscriminate introduction. Through the careless importation of rubber stumps it is thought probable that a number of fungi might be introduced, among them *Thyridaria tarda*, *Hymenochaete nozia*, *Fomes semibolus*, and *Corticium salmonicolor*.

Immortal canker, F. W. SOUTH (Agr. News [Barbados], 11 (1912), No. 263, p. 174).—In an account of a recent visit to St. Lucia the author describes a disease of immortal (*Erythrina umbrosa*), which has been known to exist for some time in that island. The disease usually starts from a cut surface, spreads rapidly, and generally kills the tree. In its early stages the bark is somewhat split and covered with a thin, shiny, transparent coating, probably consisting of a dried gummy secretion. Inside the bark is rotted, wet, and of a reddish color. Between the wood and the bark were found numerous insects, which were working almost to the advancing margin of the diseased area. As the disease progresses the parenchyma of the bark is destroyed, and the bark rips and falls off the trees in sheets.

A disease of the same species of *Erythrina* has been reported from Ceylon as due to the same fungus as that causing canker of cacao. This fungus, however, has been determined as *Phytophthora faberi*, a fungus which has not been found to develop from diseased immortal bark in St. Lucia.

It is believed that cutting out and burning the diseased bark, followed by an application of tar, would control the disease.

*Pestalozzia hartigi*, a new parasite of the silver fir, T. LAGERBERG (Meddel. lat. Skogsforsökanst. (Mitt. Forstl. Vers. Anst. Schwedens), 1911, No. 8, pp. 1-107, V, VII, figs. 10).—An account is given of a new disease found on young firs in seedbeds and nurseries in Sweden. The plants are first covered with dark or black spots; the lower portions become constricted, and the upper swollen; and the twig or plant finally dies. Cultures were grown and examined, and the disease was attributed to a fungus, *P. hartigi*.

## ECONOMIC ZOOLOGY—ENTOMOLOGY.

The vertebrates, O. JAEKEL (*Die Wirbeltiere*. Berlin, 1911, pp. VIII+252, figs. 281).—This work deals with both fossil and living forms.

A pocket list of the birds of eastern Massachusetts with especial reference to Essex County, A. P. MORSE (*Salem, Mass.*, 1912, pp. 92, tables 6, pl. 1).—

This list includes charts which show the months of the year in which the various species are present in eastern Massachusetts.

The senses of insects, A. H. FOREL (*Das Sinnesleben der Insekten*. Munich, 1910, pp. IV+393, pls. 2).—This is a collection of experimental and critical studies of insect psychology.

Control of insects and diseases in grove, garden, and field, N. M. G. PRANGE (*St. Augustine, Fla.*, 1912, pp. 156).—This is a brief popular work.

The destruction of insects and other injurious animals, A. L. CLÉMENT (*Destruction des Insectes et Autres Animaux Nuisibles*. Paris [1911], pp. 135, figs. 400).—This work consists of 5 chapters which take up the subject as follows: (1) The life and anatomy of insects; (2) methods of destruction;

(3) insects and other injurious articulates; (4) insects grouped according to the plants which they injure; and (5) injurious animals other than articulates.

Potassium cyanid as a larvicide, S. T. GUNASEKARA (*Brit. Med. Jour.*, 1912, No. 2678, p. 981).—In tests of the effect of potassium cyanid on anopheline larvae, the author found 1 part in 75,000 to destroy the larvae in 12 hours, whereas 1 part in 150,000 had no effect. When used in stagnant pools the results obtained were variable; the highest dilution having any effect was 1 in 50,000 and in some pools as much as 1 in 35,000 was required. A solution of 1 in 37,500, or 8 times the strength recommended, was required for most pools.

Fourth annual report of the state entomologist of Indiana, B. W. DOUGLASS (*Ann. Rpt. State Ent. Ind.*, 4 (1910-11), pp. 266, figs. 207).—This report consists of papers on peach growing in Indiana (pp. 13-40); insect enemies and diseases of the peach (pp. 41-66); insects injurious to shade trees, including a list of trees (pp. 67-226); miscellaneous notes on injurious insects (pp. 227-233); and bee keeping (pp. 235-261).

Forty-second annual report of the Entomological Society of Ontario, 1911 (*Ann. Rpt. Ent. Soc. Ontario*, 42 (1911), pp. 114, figs. 40).—Among the more important papers here presented are the following: Reports on Insects of the Year, by A. Gibson (pp. 9-25); Some of the Work of the Division of Entomology in 1911, by C. G. Hewitt (pp. 25-27); Insects of the Season in Ontario, by L. Caesar (pp. 28-36); Notes on the Season of 1911, by T. W. Fyles (pp. 36-38); Some Injurious Forest Insects at De Grassi Point, Lake Simcoe, by E. M. Walker (pp. 55-63); Thrips Affecting Oats, by C. G. Hewitt (pp. 63-65); A Hymenopterous Parasite of *Hepialus thule*, by A. F. Winn (pp. 70, 71); Injurious Insects of the Year, MacDonald College, Quebec, by J. M. Swaine (pp. 72-74); Insect Migration at Aweme, Manitoba, by N. Criddle (pp. 74-76); The Preparation of a Catalogue of the Insects of Canada (pp. 79-81), by C. G. Hewitt; Some Notes on *Hepialus hyperboreus*, by H. Dawson (pp. 81, 82); and Blister Beetles, by A. Gibson (pp. 83-88).

Report of the division of plant protection for the year ended June 30, 1911, C. BRICK (*Jahrb. Hamburg. Wiss. Anst.*, 28 (1910), pp. 312-337).—This detailed report of inspection and other work conducted during the year includes a list of the insects, etc., infesting imported plants, the occurrence of insect enemies and diseases of cultivated plants during the year, and an index thereto.

Insect pests of cereals and fruit trees in Russia, I. A. PORCINSKII (*Изв. Dept. Zeml. [Russia]*, 1909, pp. 608, 609; *abs. in Internat. Inst. Agr. [Rome]*).

*Bol. Bur. Agr. Intel. and Plant Diseases*, 2 (1911), No. 6, p. 1532).—An invasion of *Agrotis* sp. occurred in 1909 in many Governments in Russia, but caused serious loss only in the Governments of Tula and Ryazan. *Diplosis tritici* invaded wheat fields and caused considerable injury in the district of Belev. In eastern Russia serious injury was caused by the invasion of *Hylemyia coarctata*, the larvæ of which destroyed young spring wheat seedlings. *Rynchites auratus*, which partially destroyed the foliage of fruit trees, is reported to be spreading in southern Russia.

Insect pests of fruit trees in Russian Central Asia, I. A. PORCINSKIÏ (*Ezheg. Isp. Zeml. [Russia]*, 1909, pp. 602-604; abs. in *Internat. Inst. Agr. [Rome]*, *Bol. Bur. Agr. Intel. and Plant Diseases*, 2 (1911), No. 6, p. 1546).—The codling moth which was formerly unknown in Central Asia, appears to have been introduced since the opening of the railways with consignments of fruits and plants and has become very destructive in apple orchards throughout Turkestan, where it has no natural enemies to prevent its spread.

Mention is made of the injury by *Tingis pyri* which attacks the pear; *Oxythyra cinctella*, which attacks the blossoms of fruit trees; and *Coleophora alcyonipennella* and *Agelastica* sp., the latter of which devours the foliage of the walnut and almond.

Notes on injurious insects observed, C. W. JEMMOTT (*Ann. Rpt. Agr. Dept. [South. Nigeria]*, 1910, pp. 26-30).—These notes deal with the enemies of cotton, corn, maize, cacao, etc.

Report on economic entomology, F. P. JERSON (*Dept. Agr. Fiji Council Paper 25, 1911*, pp. V+89, pls. 6).—This report by the government entomologist deals with the Fijian insect pests as follows: Arthropoda injurious to man and animals; insects, etc., injurious to cultivated crops, including coconut, banana, sugar cane, cacao, pineapple, custard apple, granadillas, yaqona (*Piper methysticum*), cotton, yams, tobacco, melons and pumpkins, and oranges; insects injurious to ornamental shrubs; insects injurious to stored goods; and insects injurious to timber.

The 5 appendices consist of a glossary of technical terms, directions for the collection of insects, reports on a visit to the Lau group and to Honolulu, and notes on sprays and washes used as insecticides.

The enemies of the oranges and lemon in Spain, D. L. DE SALAS Y AMAT (*Bol. Agr. Téc. y Econ.*, 4 (1912), Nos. 38, pp. 167-181; 40, pp. 365, 373).—This account deals with the important insect enemies of citrus in Spain, and the remedial measures therefor.

Mango pests in Cavite and Rizal Provinces, P. J. WESTER (*Philippine Agr. Rev. [English Ed.]*, 4 (1911), Nos. 6, pp. 312-314; 12, p. 681).—It is stated that in driving through Imus and adjoining barrios the mango blossoms were observed to be almost universally blackened and dead. By sucking the juices from the buds and tender stems, the homopterous insects *Idiocerus clypeatus* and *I. nitescens* injure them, causing the flowers to drop. They also secrete a honeydew, in which a sooty mold develops, the presence of the insects being readily detected by the blackened leaves and flower panicles. At Imus, insects had practically ruined the season's mango crop, and they were doing great damage to the mangoes at San Francisco.

Another pest that appears to be quite destructive to the mango bloom is a caterpillar that enters the central stem of the flower panicle and hollows it out, causing it to shrivel and die.

Insect enemies of poplars and willows, P. LEANE (*Jour. Agr. Prat.*, n. ser., 23 (1912), No. 14, pp. 433-439, pl. 1, figs. 7).—This is a brief account of some of the more important enemies.

The enemies of *Populus canadensis*, P. VOGLING (Ann. R. Acad. Agr. Torino, 53 (1910), pp. 315-444, figs. 16).—The first part of this paper (pp. 325-377) deals with the vegetable enemies, the second part (pp. 378-440) with the insect enemies, of which 45 species are considered.

The tarbagans and the plague, L. J. TCHAOUSHOV (Vrach [St. Petersburg], 1911, No. 24-25; abs. in Off. Internat. Hyg. Pub. [Paris], Bul. Mens., 3 (1911), No. 9, pp. 1626-1630).—This paper on *Arctomys bobac* deals with its distribution, habits, and diseases, especially in its relation to plague.

Termites and living plants, J. CHAINE (Compt. Rend. Soc. Biol. [Paris], 71 (1911), No. 36, pp. 678-680; 72 (1912), No. 3, pp. 113-115).—These, the sixth and seventh papers (E. S. R., 24, p. 753) on the subject, deal with the protection of plants from termites.

New genera and species of North American Thysanoptera from the South and West, J. D. HOOD (Proc. Biol. Soc. Wash., 25 (1912), pp. 61-75, pl. 1, figs. 6).—The forms here described as new are *Stomatothrips flavus* n. g. and n. sp., from Monterey, Mexico; *Bregmatothrips venustus* n. g. and n. sp., *Haplothrips graminis* n. sp., and *Scopæothrips unicolor* n. g. and n. sp., all 3 taken at Brownsville, Tex.; *Rhopalothrips bicolor* n. g. and n. sp., taken on *Opuntia*, near Monterey, Mexico; and *Liothrips varicornis* n. sp., swept from grass and weeds at Monterey, Mexico.

Instructions for the destruction of locusts (*Instrucciones para la Destrucción de la Langosta*. Buenos Aires: Govt., 1910, pp. 60, figs. 25).—This paper gives detailed information on the destruction of locusts in Argentina.

The hemipterous enemies of cotton in Africa, H. SCHOUTEDEN (Rev. Zool. Afric. [Brussels], 1 (1912), No. 3, pp. 297-321, pls. 2, figs. 12).—The cotton insect pests here considered are the cimicid *Calidea apicalis*, the coreid *Leptoglossus membranaceus*, several species of *Dysdercus*, 4 species of *Oxyarenus*, several plant lice of the genus *Aphis*, and the coccids *Pseudococcus (Dactylopius) perniciosus* and *Chionaspis aspidistrae gossypii*.

Recent studies on the spontaneous distribution of phylloxera, B. GRASSI and M. TORI (Atti R. Acad. Lincei, Rend. Cl. Sci. Fis., Mat. e Nat., 5. ser., 20 (1911), II, No. 11, pp. 603-611; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intol. and Plant Diseases, 3 (1912), No. 2, p. 574).—The following conclusions have been drawn by the authors:

"It is wholly unlikely that phylloxera can, in compact earth not fissured or mined, affect its spread through the earth without returning to the surface, and thus infecting the roots of other vines. The influence of light on the direction of the path of the new born phylloxera insect is beyond doubt; it is attracted by light as certain moths by the lamp.

"It is likewise beyond doubt, on the other hand, that the new born phylloxera insects can attach themselves and grow without ever having seen the light, taking up their abode on the same root on which they are born (after returning to it, should they happen to have left it). Or they may pass to the other roots of the same or different vines, either in contact with or quite close to the first, traversing the fissures in the soil, the galleries burrowed by animals, the cavities formed by the working of the soil, by decomposition, by putrefaction of organic substances, etc.

"It is not in the like degree certain, but is nevertheless probable, that the new born phylloxera insect reaches the surface whenever attracted there by a little light through the soil; thus the insect obeys the influence of positive phototropism to which it is certainly subject, independently of the quality and quantity of the food it finds available. Probably, once it has reached the surface, the insect does not descend again until after night has set in."

The woolly aphis and the apple in Argentina, J. M. HUERGO (*Bol. Min. Agr. [Buenos Aires]*, 13 (1911), No. 7, pp. 358-401, pl. 1, figs. 22).—A brief account is given of the injury caused by the woolly aphis in Argentina, with directions for combating it.

White fly control, E. W. BERGER (*Fla. Quart. Bul. Agr. Dept.*, 22 (1912), No. 2, pp. 58-113).—This is a summarized account of recent work.

Notes on Cuban white flies with description of two new species, E. A. BACK (*Canad. Ent.*, 44 (1912), No. 5, pp. 145-153, figs. 7).—Nine species are recorded from Cuba, of which *Aleurodicus cardini*, taken from the guava (*Psidium guajava radtki*) at Havana and Santiago de las Vegas, and *Aleyrododes trachoides*, taken from an indigenous solanaceous vine (*Solanum seaphorthium*) at Santiago de las Vegas, are described as new to science. *A. cardini* is said to become quite abundant on guava at times and when not parasitized becomes the source of injury. In May, 1911, the author received specimens from Cuba, over 90 per cent of which had been parasitized by a hymenopteron.

The other species recorded from Cuba are *Aleyrododes citri*, *A. nubifera*, *A. howardi*, *A. variabilis*, *A. floridensis*, *A. mori*, and *Paraleyrododes perscae*.

A new coconut pest, D. B. MACKIE (*Philippine Agr. Rev. [English Ed.]*, 5 (1912), No. 3, pp. 142, 143, pl. 1).—The coconut white fly (*Aleurodicus destructor*), first collected in the vicinity of Guljungan in May, 1911, is said to be confined to a district in Negros Oriental, extending from the barrio of Tabon to the north and the barrio of Zamora on the south, a range of some 35 km. (about 21.7 miles) in length. Most of the coconut groves in this area, which extends from the seacoast back to a range of hills to the west, are infested.

The San José scale, F. LAHILLE (*Bol. Min. Agr. [Buenos Aires]*, 13 (1911), No. 7, pp. 410-416, pls. 2, figs. 2).—A brief general account.

The plum scale (*Lecanium cerasifex*), J. C. CHAPUIS (*Nat. Canad.*, 38 (1912), No. 10, pp. 145-151).—This paper consists of biological notes and directions for combating *L. cerasifex*, which appeared in orchards at Kamouraska province of Quebec, in 1911.

Native and foreign parasites of *Diaspis pentagona*, so far known and introduced into Italy, G. MARTELLI (*Abs. in Internat. Inst. Agr. [Rome]*, *Bul. ur. Agr. Intel. and Plant Diseases*, 2 (1911), No. 6, pp. 1521, 1522).—This is a summary of the work with parasites of the mulberry or West Indian peach scale.

Three common coccid enemies of the orange, A. H. ROSENFELD (*Rev. Indus. Agr. Tucumán*, 2 (1911), No. 3, pp. 116-133, pl. 1).—Descriptions of the purple scale, Florida red scale, and fern scale, with methods for their control.

Gipsy and brown-tail moth suppression, F. W. RANE (*Ann. Rpt. State Repter Mass.*, 8 (1911), pp. 81-144, pls. 4).—Details of the work of the year with these 2 pests are presented.

A newly invented power truck sprayer from which the tank can be easily removed, and the truck then used the same as any truck, is described. With this sprayer it is possible to spray both sides of the highway at the same time, while traveling.

A brief report of the work of the year with insect parasites by Dr. L. O. Howard is included. The recovery in large numbers of the Japanese egg-eater of the gipsy moth, *Schedius kuvana*, was a very encouraging feature of the summer's work. Field observations showed that it had practically been established and that in some localities 30 per cent of the eggs in a given mass had been destroyed by it. The parasite "*Monodontomerus arcus*", which attacks the gipsy and brown-tail moths in the pupal stage, is now to be found locally over the whole of eastern Massachusetts, in several towns near

Providence, R. I., through the southern part of New Hampshire, and into eastern Maine to a point nearly to Bangor. Another species, the *Pteromalus egregius*, referred to in previous reports, and which destroys the brown-tail caterpillars in the winter web, has been found in small numbers over a widely scattered area in Massachusetts, New Hampshire, and Maine. Two other species have greatly increased their range; these are *Apanteles lacticolor* and *Meteorus versicolor*."

Some very good results are thought to have been obtained in several places from work with the gipsy moth wilt disease, the work with which will be prosecuted on a much larger scale during the following year. More plantings of the brown-tail fungus were made with apparently excellent results. The fungus disease of the gipsy moth is said to still be in the experimental stage. The conditions of the moth work at the present time in cities and towns in the infested district are described.

[Silkworm studies] (*Lab. Études Soie Lyon, Rap. Com. Adm.*, 14 (1908-1910), pp. XVI+261, pls. 25, figs. 36).—The sericultural papers here presented include the following: A Study of the Utilization of Cold in Sericulture, by J. Testenoire (pp. 47-54); On a Muscardine of the Silkworm not Caused by *Botrytis bassiana*; A Study of *B. effusa* n. sp., by J. Beauverie (pp. 55-81), previously noted (E. S. R., 26, p. 757); Description of the Habits of *Cricula andrei*, by E. André (pp. 83-89); New and Little Known Saturniids and Pinarids of Senegal, by P. Riel (pp. 91-99); A Study of the Wild Silkworm *Borocera madagascariensis*, by Grangeon (pp. 101-118); The Acustoming of the Silkworm (*Bombyx mori*) to the Leaves of *Scorzonera hispanica*, by C. Villard (pp. 119-122); A Psychid Case Bearing Silkworm (*Eumeta junodi*), (pp. 123-125); and Researches on the Development of the Egg of the Univoltin Silkworm (pp. 127-152) (E. S. R., 23, p. 759), both by C. Vaney and A. Conte; The External Sexual Characters of Chrysalids (pp. 153, 154), and The Diseases of Silkworms, in which pebrine is dealt with, by D. Levrat and A. Conte (pp. 155-163); A Bostrichid (*Xylotrips flavipes*) Injurious to Silk (pp. 163-167), by A. Conte and D. Levrat; The Genus *Theophila* and the Affinities of *Bombyx mori* (pp. 169-174), and A Classification of the Lepidopterous Silk Producers (pp. 175-256), both by A. Conte.

Potato moths in Bengal in 1911, E. J. WOODHOUSE (*Dept. Agr. Bengal, Quart. Jour.*, 5 (1912), No. 3, pp. 146-153).—This is a second report (E. S. R., 25, p. 761).

Notes on the life history of *Nepticula slingerlandella* (Tineidae), C. R. CHERRY (*Canad. Ent.*, 44 (1912), No. 1, pp. 25-27).—The data here presented have been noted from another source (E. S. R., 26, p. 557).

Mosquitoes and river vessels, A. BALFOUR (*Lancet* [London], 1912, I, No. 16, pp. 1048-1051, fig. 1).—The author states that the constant attention which has been given has not prevented the invasion of Khartum every now and then by mosquitoes (*Stegomyia fasciata*, *Culex fatigans*, etc.) from steamers and boats plying on the Nile. "Not a year passes but that cases of locally acquired malaria are traced, more or less definitely, to infected anophelines brought into the town precincts by river vessels."

Some parasites of *Simulium* larvæ and their effects on the development of the host, E. H. STRICKLAND (*Biol. Bul.*, 21 (1911), No. 5, pp. 302-333, pls. 5).—Two parasites, one a worm (*Mermis* sp.) and the other a new sporozoon for which the name *Glugea polymorpha* is proposed, have been found by the author commonly to infest *Simulium* larvæ (*S. hirtipes* and an undescribed species) in streams in the vicinity of Forest Hills, Mass. The *Mermis* does not affect the larval development to any extent, except by slightly increasing its size, but it inhibits the development of the histoblasts to such an extent that

pupation becomes impossible. Parasitized larvæ never pupate, but are killed by the worms when they escape. Of 174 larvæ examined, 41 were found to be parasitized. In one case as many as 12 worms were removed from a single host; they all remained small apparently from insufficient food supply.

Parasitism by *G. polymorpha* was found to vary from 1 to 80 per cent.

On the life history of the ox warble (*Hypoderma bovis*), PETER (Mitt. Dcut. Landw. Gesell., 27 (1912), No. 11, pp. 156-163, figs. 6).—In this paper the author reports the results of studies commenced in March, 1910, and continued during the summer of 1911 at Hamburg abattoirs. Illustrations showing the development of the larvæ during the various months of the year are included.

How to get rid of flies, F. P. STOCKBRIDGE (World's Work, 23 (1912), No. 6, pp. 692-703, figs. 11).—This paper includes accounts of fly campaigns conducted during 1911 in Weir and Topeka, Kans., Wilmington, N. C., Boston and Worcester, Mass., Baltimore, Md., Washington, D. C., and other cities and towns.

[Transmission of *Trypanosoma hippicum* by the house fly] (Rpt. Dept. Sanit. Isthmian Canal Com., 1912, Apr., p. 41).—"Musca domestica caught in Panama were fed with the blood of guinea pigs richly infected with trypanosomes (*T. hippicum*), and after intervals of 23, 46, and 126 minutes microscopic examinations of fluid from the proboscis of some of the flies were made, and animal inoculations were made with material from others. Actively motile living trypanosomes were demonstrated in the mouth parts of the flies 126 minutes after feeding. . . .

"The fact here experimentally established that *M. domestica* can carry living trypanosomes for so long a time as 2 hours shows that with the naturally acquired disease ample time is given for the transference of the infecting agent from the excoriated patches on the skin of infected mules to the freshly abraded surfaces on the skin of noninfected mules, as was previously assumed from an epidemiological study of the disease and its probable mode of infection."

African fruit flies, F. ZACHER (Tropenpflanzer, 16 (1912), No. 5, pp. 236-243, figs. 3).—Eleven species of *Ceratitis* and *Dacus* are known to be of economic importance in Africa.

Fruit fly control, W. M. GIFFARD (Hawaii. Forester and Agr., 9 (1912), No. 1, pp. 108-114).—A brief report of work carried on against the Mediterranean fruit fly in Hawaii.

Systematic notes on North American Tachinidæ, J. D. TOTHILL (Canad. Ent., 44 (1912), No. 1, pp. 1-5).—*Winthemia fumiferanæ* bred from the spruce sawfly (*Tortrix fumiferanæ*) in the Provinces of Quebec and British Columbia is described as new to science.

Narcissus fly (*Merodon equestris*) [attacking *Galtonia candicans*], E. H. ATKINS (Gard. Chron., 3, ser., 50 (1911), No. 1296, p. 310).—The author has repeatedly found the larva of *M. equestris* in Dutch cultivated bulbs of *G. candicans*, the earliest instance having been some 22 years ago. In the case of the daffodil, discoloration of the outer tissues of the bulb is a not infrequent indication of the presence of the larva, though it may be as frequently due to the presence of the bulb mite (*Rhizoglyphus* sp.).

Mustard beetles, R. S. MACDOUGALL (Jour. Bd. Agr. [London], 18 (1911), p. 12, pp. 1017-1020, fig. 1).—The insects here considered are the mustard beetle (*Phædon betulæ*) and the turnip, mustard, and cabbage flower, beetle (*Leptoglossus æneus*).

An experimental study on the death feigning of *Belostoma* (= *Zaitia* rect.) flumineum and *Nepa apiculata*, H. H. P. and H. C. SEVEBIN (Behavior Monographs, 1 (1911), No. 3, pp. 44, pl. 1; obs. in Science, n. ser., 35 (1912), p. 903, pp. 628-630).—The general characteristics of the death feint are dis-



cussed, together with the duration of successive death feints; the effect of dryness and moisture, temperature, and light on the duration; the effect of mutilation; the origin and development of the death feint; and its psychic aspect. A bibliography of 23 titles is appended.

*Dascillus cervinus* as a marshy meadow pest, W. HEROLD (*Centbl. Bakt. [etc.]*, 2. Abt., 33 (1912), No. 17-19, pp. 438-442, pl. 1, figs. 6).—The larva of this beetle is reported to have been the source of injury to meadows in the southern part of the Province of Posen.

A new enemy of the coconut palm, G. HEESCHER and L. MILLOT (*Abd. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases*, 2 (1911), No. 6, pp. 1552-1554).—A small nocturnal beetle of the genus *Hylecoetus*, the larva of which bores in the trunk, is reported to be a serious enemy of the coconut palm all along the northwestern coast of Madagascar.

A grove of deformed trees, R. J. TERRY (*Science*, n. ser., 35 (1912), No. 905, p. 715).—A grove of 400 or 500 small persimmon trees in St. Louis County, Mo., is said to have suffered from the ravages of beetles (*Oncideres cingulata*), limbs of young and old trees varying in diameter from 5 to 15 mm. (from 0.2 to 0.6 in.) being girdled and the ends falling to the ground. The girdling is said to be done mainly in September and October.

"There is no tree in the grove that does not present crooked trunk and limbs. The deformities in some cases are extreme. Most of the trees are as a consequence dwarfed, although able to make some advance in growth."

On an enemy of the coffee tree, L. DUPOST (*Bul. Econ. Indo-Chine*, n. ser., 14 (1911), No. 90, pp. 392-397, fig. 1).—An account of *Xyleborus coffea* and its injury to *Coffea robusta* in Indo-China.

Bark beetles (Ipidæ) which live in rubber trees, M. HAGEDORN (*Rev. Zool. Afric. [Brussels]*, 1 (1912), No. 3, pp. 336-346, pl. 1, figs. 11).—Twelve species are here dealt with, namely, *Diamerus fci*, *Phlaotribus puncticollis*, *Stephanoderes congonus* n. sp., *S. heveæ* n. sp., *Hypothenemus tuberculosus* n. sp., *Cryptarthrum walkeri*, *Xyleborus affinis*, *X. ambastus* n. sp., *X. camerunus*, *X. cognatus*, *X. confusus*, and *X. spathipennis chausi* n. var.

A new enemy of the Douglas fir (*Pseudotsuga douglasii*), M. DE KONING (*Abd. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases*, 2 (1911), No. 6, p. 1554).—The beetle *Strophosomus obscurus* is said to have destroyed the annual shoots of Douglas fir in the Province of North Brabant, Netherlands, young trees being most severely injured. Gradually the dead branches lose their needles and nothing remains but dry wood. Careful observation shows that the bark at their base has been eaten away. As the injured branches live on for some time, the sap which oozes out sometimes forms a thickening just above the wound.

Apiculture in Tunis (*Bul. Dir. Gén. Agr. Com. et Colon. Tunis*, 14 (1910), No. 57, pp. 448-475, pls. 2, fig. 1; 15 (1911), Nos. 58, pp. 74-107, pl. 1, fig. 1; 64, pp. 645-700, figs. 6).—A general account of bee keeping in Tunis with statistical data.

Bee diseases in Ontario, M. PETTIT (*Ontario Dept. of Agr. Bul.* 197, 1912, pp. 16, figs. 4).—This is an account of American foul brood, European foul brood, and starved or pickled brood, their prevention and treatment. A report of inspection of apiaries of Ontario follows.

Report on the Isle of Wight bee disease (microsporidiosis) (*Jour. Bd. Agr. [London]*, 19 (1912), No. 2, Sup. 8, pp. 143, pls. 6, figs. 2).—This report consists of 13 parts, in addition to an extensive bibliography, which take up the subject as follows: Introduction, by G. S. Graham-Smith (pp. 5-11); The History of the Disease (pp. 12-23) and Symptoms (pp. 29-38), by G. W. Bullamore and W. Malden; The Relation of *Nosema apis* to the Isle of Wight Disease, by G. S.

Graham-Smith, H. B. Fantham, and Annie Porter (pp. 39-56); The Life History of *N. apis*, and the Significance of the Various Stages of the Parasite in the Disease, by H. B. Fantham and Annie Porter (pp. 57-78); Experimental Infection with *N. apis*: (a) Earlier Infection Experiments, by H. B. Fantham and Annie Porter (pp. 79-81), and (b) Infection Experiments Carried out During 1911, by G. S. Graham-Smith and G. W. Bullamore (pp. 81-94); The Ways in Which the Disease may be Spread, by G. S. Graham-Smith and G. W. Bullamore (pp. 95-118); Some Field Observations on Natural Methods of Infection, by H. B. Fantham and Annie Porter (pp. 119-122); Examinations of Certain Insects Found in Hives, by H. B. Fantham and Annie Porter (pp. 123, 124); Treatment and Prevention, by G. S. Graham-Smith and G. W. Bullamore (pp. 125-129); Microsporidiosis in Other Hymenoptera: (a) Infection Experiments, by H. B. Fantham and Annie Porter (pp. 130, 131), (b) Observations on Humble Bees, by H. B. Fantham (p. 131), and (c) Infection Experiments and Observations, by G. S. Graham-Smith (pp. 131, 132); Bacteriology of the Disease, by W. Malden (pp. 133-137); and Note on Certain Protozoa Found in Bees, by H. B. Fantham and Annie Porter (p. 138).

A contribution to the embryology and to the biology of *Apanteles glomeratus*, R. GRANDORI (*Redia*, 7 (1911), No. 2, pp. 363-428, pls. 4, fig. 1).—A detailed report of studies of this braconid parasite of the cabbage butterfly (*Pieris brassicae*).

The pear slug (*Caliroa cerasi* [*Eriocampoides limacina*]), R. L. WEBSTER (*Iowa Sta. Bul.* 130, pp. 167-192, figs. 13).—This is a detailed report of studies of the life history and bionomics and of remedial measures for the pear slug (*C. cerasi*), a brief account of which has been previously noted (*E. S. R.*, 26, p. 363). The subject is taken up under the headings of control measures; past history, destructiveness, and distribution; food plants; classification; life history; and natural enemies. A bibliography of 35 titles is appended.

The slugs feed on the upper surface of the leaves, removing only the upper portion and leaving the veins bare, badly injured trees appearing as if they had been scorched by fire. The damaged leaves dry, turn brown, curl up, and finally fall. Frequently trees are entirely stripped of their foliage in midsummer. Cherry trees, under such conditions, are forced to put out a new growth of leaves, weakening the tree and greatly reducing the crop of fruit the following year.

There appear to be 2 generations of the insect in central and northern Iowa. In central Iowa the first brood slugs appear in June and early in July and the second in July and during August, the 2 generations generally being quite distinct. The winter is passed by the slugs within their cocoons in the soil. In the spring they pupate, and late in May and early in June the adult sawflies emerge from the cocoons and deposit their eggs under natural conditions just beneath the epidermis of the upper side of the leaves of cherry, plum, and other trees. The egg hatches in from 10 to 18 days and in the vicinity of Ames most of the slugs have become fully grown and have gone into the soil beneath the trees where they are feeding by July 4, the adult flies emerging about the middle of the month. At Ames most of the second brood slugs have disappeared by the middle of September, although a few straggling ones may be found after that time.

Parthenogenesis is thought to occur in this species although it has not been satisfactorily proven. Large numbers of sawflies have been collected and examined by the author without the discovery of a single male. The author is found much variation in the number of molts passed. Thus in 14 cases only observed 5 larvae molted 5 times, 5 molted 6 times, 3 molted 7 times, and 1 molted 8 times.

Investigations show hellebore, lead arsenate, and Paris green to be the less expensive of the treatments recommended. One lb. of hellebore to 5 lbs. of air-slaked lime, or 1 lb. of hellebore to a barrel of water; lead arsenate 2 lbs to 50 gal. of water; Paris green 1 lb. to 150 gal. of water; kerosene emulsion containing 10 per cent kerosene; whale oil soap, 1 lb. to 2 gal. of water; white laundry soap and Ivory soap, one 10-oz. bar to 2 gal. of water were all effective in combating the pest. Attention is called to the fact that cultivation under infested trees is of value since it disturbs the cocoons in the soil.

A sawfly injurious to the gooseberry, G. LÜSTNER (*Möller's Deut. Gärt. Ztg.*, 26 (1911), No. 25, p. 295, figs. 2).—The sawfly *Nematus ventricosus* is reported to have been a serious enemy of the gooseberry in Germany during the early part of the season of 1911.

The large larch sawfly (*Nematus erichsoni*), E. B. DUNLOP (*Zoologist*, 4 ser., 16 (1912), No. 184, pp. 147-156).—A brief account of this sawfly, its habits, injury, etc., in Great Britain.

A contribution to the knowledge of the galls of North America, A. TARTER (*Marcellia*, 10 (1911), Nos. 1, pp. 28-32, pls. 2, figs. 4; 2, pp. 53-61, figs. 17).—Eighty-eight galls collected by F. Silvestri in Oregon, Washington, California, Arizona, Mexico, and Hawaii are here described, many of which are new.

Information concerning ticks (*Agr. News* [Barbados], 10 (1911), No. 24, p. 314).—A brief account of the occurrence of ticks in the West Indies.

Some new North American *Ixodidae* with notes on other species, F. C. BISHOPP (*Proc. Biol. Soc. Wash.*, 24 (1911), pp. 197-208, pl. 1).—Two new species and 2 new varieties are here described, namely, *Ixodes banksi*, taken from muskrat (*Fiber zibethicus*) in Arkansas; *I. kingi*, taken from the badger (*Taxidea taxus*) and other hosts in Wyoming and other western States; *I. cooki rugosus*, taken from the dog in Oregon, Washington, and California; and *I. angustus woodi*, taken from Baird's wood rat (*Neotoma micropus*), in Texas.

New laboulbeniacean parasites of acarids, G. PAOLI (*Redia*, 7 (1911), No. 2, pp. 283-295, pl. 1).—Three species of *Rickia* and 3 of *Dimeromyces* are here described as new.

Handbook of pathogenic protozoa, edited by S. VON PROWAZEK (*Handbuch der Pathogenen Protozoen*. Leipzig, 1912, pt. 3, pp. 249-360, pl. 1, figs. 50).—In this third part (E. S. R., 26, p. 865), the pathogenic trypanosomes are dealt with by M. Mayer (pp. 249-323); the Cnidosporidia (Myxosporidia and Microsporidia), by O. Schröder (pp. 324-344); and the Sarcosporidia, by E. Teichmann (pp. 345-360).

A bibliography accompanies each paper.

## FOODS—HUMAN NUTRITION.

[Refrigeration and food products] (*Ber. II. Internat. Kälttekong. Wien*, 1 (1910), pp. 308, pls. 3; 2 (1910), pp. 1085, pls. 2, figs. 67, figs. 109).—A number of papers were presented at the Second International Refrigeration Congress at Vienna of special interest to students of nutrition and related matters. Volume 2 contains the full papers and volume 1 the discussions, lists of members, and other general data.

Among others the following papers may be mentioned: Changes in the Physical and Morphological Character of Foods (Meat, Fish, and Milk), by Bützler; Cooling Houses and Other Buildings in the Tropics, by J. F. H. Koopman; Studies of the Preservation of Horseflesh by Cold and Its Use for Food Purposes, by A. Costa and N. Mori; The Effect of Low Temperatures on

the Life Processes of Fruits and on the Rate of Fermentation of Cider, by H. C. Gore; The Refrigeration of Poultry and Eggs in the United States, by Mary E. Pennington; The Manufacture of Ice, by Sandras; An Improved Method of Packing Gutted Fish for Transport and Keeping it Fresh and Sweet for a Long Time, by A. Soelling; A New Application of Low Temperature to the Preparation of Concentrated Food Extracts or Solids, Particularly Milk Powder, by F. G. Lecomte and A. R. Loinville; The Preservation of Eggs by Low Temperature, by F. Lescardé; Importation and Exportation of Meat to Different Countries with Special Reference to the Use of Cold Storage and Frozen Meat in the Netherlands, by F. B. Löhnis; The Relative Value of Frozen and Refrigerated Meat for Food Purposes, Particularly with Reference to the Army, the Navy, and Public and Private Institutions, by H. Martel; Refrigeration and Ventilation of Inhabited Places, by H. Torrance, Jr.; Relative Value of Frozen and Refrigerated Meat in General and Particularly for the Army and Large Groups, by H. Viry; Cold Storage and the Preservation of Fresh and Salted Meat, by L. van Wanjenbergh; Feeding the Nations, by A. de Wendrich; and Several Methods of Testing Cold Storage Insulation, with Comparative Results, by W. M. Whitten.

The essential constituents in food, E. F. ARMSTRONG (*Chem. World*, 1 (1912), No. 5, pp. 147-149).—A summary of some of the newer work in nutrition, particularly studies of the effects of cooked and uncooked food and similar topics.

Brooklyn Eagle government cook book (*Brooklyn*, 1912, 2. ed., pp. 112).—This publication is a reprint of Farmers' Bulletins 85, Fish as Food (E. S. R., 10, p. 678); 128, Eggs and Their Uses as Food (E. S. R., 13, p. 166); 142, Principles of Nutrition and Nutritive Value of Food (E. S. R., 13, p. 974); 203, Canned Fruit, Preserves, and Jellies—Household Methods of Preparation (E. S. R., 16, p. 392); 293, Use of Fruit as Food (E. S. R., 19, p. 60); and 391, Economical Use of Meat in the Home (E. S. R., 23, p. 165).

Phosphorus in Indian foodstuffs, D. HOOPER (*Jour. Asiatic Soc. Bengal*, n. ser., 7 (1911), pp. 313-322; *abs. in Jour. Soc. Chem. Indus.*, 31 (1912), No. 2, p. 88; *Nature* [London], 88 (1912), No. 2209, p. 594).—The data reported have to do with the phosphorus content of polished and unpolished rice, rice polish, Indian wheat, and wheat flour; and of barley, pearl barley, lentils, cheese, smoked fish, cooked potatoes, beans, pineapple, edible birds nest, and other foodstuffs.

The author discusses the alleged relation of phosphorus in milled rice to beriberi. Experiments made with fowls fed rice of varying quality showed that polyneuritis developed when milled rice was used but not with husked rice. With rice containing only 0.277 per cent phosphoric anhydride the disease appeared in a few weeks, while with rice containing 0.469 per cent it did not appear. Analyses of rice from various parts of India showed that on an average unmilled rice contained 0.65 per cent phosphoric anhydride and milled rice 0.38 per cent. Pulses (legumes) contained larger proportions, and, according to the author, it is significant that pulse eaters generally remain free from the disease, while their neighbors, who are rice eaters, are attacked by it.

Cryoscopy of meat extract, T. JONA (*Kryoskopie der Fleischextrakte*, *Pavia*, 911, pp. 15; *abs. in Chem. Zentbl.*, 1912, I, No. 14, p. 1136).—Results of cryoscopic studies of meat extracts are reported.

Microbial content of cooked sausage, G. GUÉRIN (*Hyg. Viande et Lait*, 6 (1912), No. 4, pp. 197-207).—Results reported show the occurrence of microorganisms in sausage and on sausage casings.

Analyses of wheats and flours [and barleys], J. C. BRÜNNICH (*Ann. Rpt. Exp. Agr. and Stock* [Queensland], 1910-11, pp. 58-60).—A large number of

analyses are reported. The data for wheat include the yield, weight per bushel, yield of milling products, composition of the flour, results of baking tests, and similar information.

**Technical flour analysis and comparative baking test.** O. J. FREED (*Oper. Miller*, 17 (1912), No. 7, pp. 467-469).—The analytical data reported illustrate the methods followed in the technical examination of flour for bread-making purposes.

The effect of organic acids on wheat bread with reference to infection with micro-organisms causing slimy bread, M. P. NEUMANN, K. MOHS, and O. KNISCHEWSKY (*Ztschr. Gesam. Getreidew.*, 4 (1912), No. 5, pp. 127-132, figs. 3).—The hay bacillus does not develop and cause slimy bread in an acid dough, provided the acidity is equal to at least 0.3 per cent lactic acid or 0.1 acetic acid.

Sour milk can be used in the baking industry as a convenient method for hindering slimy bread. Organic acids exercise a favorable effect upon the character of the bread, since they increase volume and improve the porous texture. Lactic acid proved the most satisfactory, about 0.5 per cent being the maximum amount desirable. With over 1 per cent the expansion of the dough was not nearly so good. With acetic acid the quantities are somewhat smaller, 0.3 per cent being the maximum amount which can be used without affecting the dough unfavorably. Formic acid, owing to the small quantities in the dough, is without special effect upon the fermentation. According to the investigations reported, 0.2 per cent prevents the development of the micro-organisms causing slimy bread.

Some experiments on the relative digestibility of white and whole meal breads, L. F. NEWMAN, G. W. ROBINSON, E. T. HALLMAN, and H. A. D. NEVILLE (*Jour. Hyg. [Cambridge]*, 12 (1912), No. 2, pp. 119-143).—The chief purpose of the experiments reported was to study the relative digestibility of white and so-called "standard" breads. The tests were made with 4 men and were of 7 days' duration.

"With regard to digestibility, the information given by the experiments may be looked upon as conclusive. The 4 individuals who ate the breads varied greatly in physical type, and the 2 forms of bread were eaten by all under strictly comparable conditions.

"As measured by energy and protein the degree of absorption in different individuals showed marked uniformity. In the case of phosphorus 1 individual showed a degree of absorption which was considerably less than that of the other subjects. The results as a whole lend no support to any extreme view as to the advantages or disadvantages possessed by standard bread; at any rate as regards the availability of the main, and more familiar food constituents.

"With respect to the availability of their total energy white bread and standard bread differ but little. With regard to protein there is a distinct advantage on the side of white bread, some 3½ per cent more of its nitrogen content being absorbed.

"On the other hand, the experiments lend no support to the belief that the phosphorus compounds of bread of the "standard" type are worse absorbed than those of white bread, so that the former contains an appreciably larger amount, not only of total, but of available phosphorus. The ratio of available phosphorus to available nitrogen stands, in the case of the standard bread, nearer to the ratio present in efficient mixed dietaries, a circumstance, however, which only becomes of practical significance when bread forms a large proportion of a person's dietary."

Experiments for a shorter period (3 days) were made with 2 of the subjects with 2 breads containing a larger proportion of the wheat berry than so-called

"standard" breads, the results showing that the availability of the nitrogen and phosphorus present was lower. "With regard to the possible importance and special nutritive influence of unknown constituents present in the cortex of wheat, the experiments described yield no evidence. The periods were of course much too short, and, moreover, to judge from the available knowledge on the matter, the milk taken would supply an equivalent for such factors. They can only be of practical importance in cases where bread forms a very large proportion of the total dietary, and their influence can only be tested by our observations carried out on special communities."

Principles of jelly making, NELLIE E. GOLDTHWAITE (*Cornell Reading Courses, Food Ser., 1912, No. 3, pp. 241-254*).—Results of the author's experiments (*E. S. R., 24, p. 363*) are summarized with particular reference to home jelly making.

Studies of the utilization of dum palm: The chemical composition and food value of its fruit (*Agr. Colon. [Italy], 6 (1912), No. 4, pp. 129-152*).—Analyses are reported and discussed.

[Mince-meat and other pure food and drug topics], E. F. LADD and ALMA K. JOHNSON (*North Dakota Sta. Spec. Bul., 2 (1912), No. 5, pp. 81-92, 94-96*).—Results are reported and discussed, of the examination of 51 samples of mince-meat and of miscellaneous foodstuffs.

Of the samples of mince-meat examined, 19 contained no meat or less than 1 per cent (i. e., no meat fiber could be detected), 18 contained less than 3 to 6 per cent meat, and 14 less than 6 to 10 per cent. In cases of samples containing no meat fiber, "the flavor of meat was undoubtedly due to the presence of meat extract."

Seven of the samples contained glucose. Commenting on the results of their investigations, the authors state that "to add starch or glucose, making the same largely a constituent of the [mince] meat, is equally deceptive. The fruit can not legitimately be tomatoes, or apple skins, or waste material generally discarded as articles of food."

According to the authors' view, few of the preparations examined were entitled to be classed as mince-meats under ordinary definitions.

Vinegar and vinegar laws, J. O. JORDAN (*Mo. Bul. Health Dept. Boston, 1 (1912), No. 3, pp. 57-59*).—A proposed law regulating the sale of vinegar is outlined.

Official food analysis, 1912, R. E. ROSE and A. M. HENRY (*Fla. Quart. Bul. Agr. Dept., 22 (1912), No. 2, pp. 194-197*).—Analyses of miscellaneous food materials are reported.

[Food inspection and other pure food topics] (*Tenn. Food and Drugs Insp. Bul. 5, 1911, pp. 100, fig. 1*).—Results of the examination of a number of miscellaneous foods are reported, and short weights, pure food and drugs, and related topics are discussed.

Camp cookery in the West, C. F. SAUNDERS (*Country Life Amer., 22 (1912), No. 3, pp. 51, 52, figs. 6*).—Camp provisions, methods of camp cookery, and other similar problems are discussed and some recipes given.

Cooking with electricity, ELLEN A. HUNTINGTON (*Deseret Farmer, 7 (1912), No. 37, pp. 792, 793*).—Electrical cooking apparatus is discussed, particularly with reference to its cost.

[Report of the] committee on markets, AMY A. BRADLEY (*Women's Municipal League Boston Bul., 3 (1912), No. 5, pp. 24-26*).—An account is given of the survey work with reference to market conditions in Boston and the attempts which have been made to remedy them.

The budget of a vine dresser's family in Caltagirone, C. CONIGLIO (*Rivista [Conegliano], 5. ser., 18 (1912), Nos. 8, pp. 173-181; 9, pp. 201-206; 10, pp.*

232-235).—Data regarding the amount and cost of individual foods, as well as total expenditures for food, are summarized in this statistical study of the household expenditures of an Italian vineyard laborer's family.

Synthesis of cell building material in plants and animals, E. ABDELHALDEN (*Synthese der Zellbausteine in Pflanze und Tier. Berlin, 1912, pp. X+123*).—The author discusses fundamental problems of nutrition on the basis of his own extended investigations and the work of others.

Such questions are considered as the work of plant cells, the synthesis of cell building material by plants; the work of animal cells; the transformation of nutritive material in the body substances, blood, and cell substances; the metabolism of carbohydrates, fats, phosphatids, nucleo-proteids, protoids, and inorganic material in organic combination; the solution of the problem of nutrition with synthetic products (E. S. R., 26, p. 869); and the possible application of recent work along such lines to invalid dietetics.

Experiments on the influence of a number of foods upon the solubility of uric acid, M. HINDHEDE (*Skand. Arch. Physiol., 27 (1912), No. 1-3, pp. 87-99, figs. 3*).—Continuing experiments previously reported (E. S. R., 26, p. 765), the author studied the effects of different foods upon the solubility of uric acid and the presence in the urine of uric acid which precipitates. In general, he concludes that a bread, potato, and fruit diet, with small amounts of milk, is the ideal in this respect, as distinguished from the sort of vegetarian diet made up chiefly of such foods as beans, peas, lentils, cabbage, salad plants, and spinach.

The influence of an excess of sodium chlorid upon nutrition and renal excretion, A. DESGREZ and Mlle. B. GUENDE (*Compt. Rend. Acad. Sci. [Paris], 154 (1912), No. 15, pp. 939-941*).—According to the results of experiments with dogs which are briefly reported, an excess of sodium chlorid without an excess of water lowered the metabolism of nitrogen qualitatively and quantitatively. When the excess of salt was accompanied by an excess of water the excretion of nitrogen was increased quantitatively but lowered qualitatively. In all cases an excess of sodium chlorid apparently diminished cleavage processes qualitatively. It would seem that salt in excess, lowering, as it does, elaboration and elimination, would favor autointoxication.

The elimination of caffeine: An experimental study of Herbivora and Carnivora, W. SALANT and J. B. RIEGER (*U. S. Dept. Agr., Bur. Chem. Bul. 157, pp. 23*).—According to the authors' investigations, continuing previous work (E. S. R., 27, p. 166) caffeine introduced subcutaneously, by mouth, or intravenously, is eliminated by rabbits and guinea pigs in part unchanged, in the urine, into the gastrointestinal canal, and into the bile. The amount recovered in the urine was in most cases approximately from 6 to 10 per cent with rabbits and from 6 to 11 per cent with guinea pigs. More caffeine was eliminated in the urine on a diet of carrots than of oats and hay, but the reverse was noted with the elimination into the gastrointestinal tract, which was marked with both kinds of animals.

"The presence of very small quantities of caffeine in the gastrointestinal contents of animals at the end of 48 hours points to its reabsorption into the circulation, since destruction of caffeine is highly improbable on account of its resistance to bacterial action."

Cats and dogs were found to eliminate very small quantities, slightly over 1 per cent of the amount ingested. "The elimination of caffeine begins soon after its introduction into the circulation. It was found in the urine from 15 to 40 minutes after its subcutaneous injection and in some cases continued to be present for 48 hours. The greater part, however, is eliminated during the first 24 hours, only small quantities being found in the urine later."

"The data herein presented lead to the conclusion that in the carnivora larger amounts of caffeine are demethylated than in the herbivora, and that the resistance to caffeine is inversely as demethylation, since it has been shown that caffeine is much more toxic for carnivora than herbivora. The mechanism of demethylation is in all probability utilized in the body as a means of defense against the deleterious action of caffeine, being more active in organisms for which the drug is more toxic."

A bibliography is appended.

Studies on water drinking.—XIII, Hydrogen ion concentration of feces, P. E. HOWE and P. B. HAWK (*Jour. Biol. Chem.*, 11 (1912), No. 2, pp. 129-140).—The hydrogen concentration of the feces of 2 men was determined in a water drinking experiment, and of 1 man in a fasting experiment, with the usual preliminary and final periods.

"The reaction of the feces was uniformly alkaline, the hydrogen ion concentration varying between  $0.15 \times 10^{-8}$  and  $0.8 \times 10^{-8}$ . As the result of water drinking with meals there was a tendency for the hydrogen ion concentration to increase. Pronounced changes in the dietary régime, such as high protein, low protein and fasting, did not affect the hydrogen ion concentration of the feces sufficiently to cause other than small variations in the uniformly alkaline reaction. As the result of fasting, the stools were alkaline in reaction (hydrogen ion concentration of  $1.4 \times 10^{-8}$  and  $0.94 \times 10^{-8}$ ) as opposed to the acid stools reported by previous investigators. The hydrogen ion concentration differs for the feces of different individuals living on the same diet."

Earlier work has been previously noted (E. S. R., 27, p. 168).

Fasting studies.—VI, Distribution of nitrogen during a fast of one hundred and seventeen days, P. E. HOWE, H. A. MATTHEL, and P. B. HAWK (*Jour. Biol. Chem.*, 11 (1912), No. 2, pp. 103-127, fig. 1).—In general, the percentage of nitrogen distribution was similar to that reported by the authors in connection with shorter fasting studies with dogs (E. S. R., 26, p. 360).

Fasting studies.—VII, The putrefaction processes in the intestine of a man during fasting and during subsequent periods of low and high protein ingestion, C. P. SHEERWIN and P. B. HAWK (*Jour. Biol. Chem.*, 11 (1912), No. 3, pp. 169-177).—Continuing the above experiments, the present investigation was conducted with a normal man weighing 76 kg. to study the influence of fasting, and a subsequent feeding of low and high protein diets upon the course of intestinal putrefaction. The authors summarize the work as follows:

"Intestinal putrefaction as measured by the output of urinary indican was markedly decreased during the fasting interval. The seventh fasting day showed an indican excretion amounting to 13.7 mg. as against an output of 60.5 mg. for the second fasting day. During the postfasting interval of low protein ingestion putrefaction was increased in a very pronounced manner, the indican values rising far above those obtained during the normal period preceding the fast. The average daily indican output was but slightly higher during the period of high protein ingestion than during the low period.

"The indican data for the preliminary period, when taken into consideration in connection with other similar data collected previous to certain tests upon the influence of a high water ingestion, furnish an important verification of a conclusion previously reported from this laboratory to the effect that 'the drinking of copious or moderate volumes of water with meals decreases intestinal putrefaction as measured by the urinary indican output.'

"It was demonstrated that intestinal putrefaction was 50 per cent greater when but 5.23 gm. of nitrogen was passed into the gastro-intestinal tract after the fast than it was when 21.86 gm. of nitrogen was ingested before the fast.



"Data from this and previous experiments along similar lines made upon [one of the subjects] seem to indicate that there is of necessity no uniform relationship between the urinary indican excretion and the output of bacteria in the feces, even when the diet of the subject is of the same general character.

"The indican value for the high protein period subsequent to the fast was approximately 60 per cent higher than the indican value for the preliminary period, notwithstanding the fact that the ingested diet was identical in kind and quantity in the two instances.

"On the seventh day of fasting approximately 40 per cent of the total quantity of ethereal- $\text{SO}_2$  excreted in the urine was in the form of indican- $\text{SO}_2$ , whereas only about 10 per cent was excreted in this form in the urine of the fourth fasting day."

An experiment on a fasting man, F. G. BENEDICT (*Science*, n. ser., 35 (1912), No. 909, p. 865).—A brief note is given regarding a 31-day experiment during complete fasting. Many factors, including those measurable with the respiration calorimeter, were taken into account.

The interstitial granules of striated muscle and their relation to nutrition, E. T. BELL (*Internat. Monatsschr. Anat. u. Physiol.*, 28 (1911), No. 10-12, pp. 297-347, pl. 1; abs. in *Zentbl. Biochem. u. Biophys.*, 13 (1912), No. 3, p. 92).—The interstitial granules of striated muscles of mammals were found to consist chiefly of liposomes. Neither fatty acids nor soaps were found.

During fasting the liposomes disappear from the muscle and appear again on feeding. In the case of the frog an increase of these bodies is noticed at the beginning of summer and a decrease in autumn. When rats are fed fat meat a marked increase in liposomes is noted and a deepening of their color. The author believes that the liposomes are not cellular organs but fat depositories.

An extended bibliography is included.

Idiosyncrasy and anaphylaxis (*Med. Rev. of Reviews*, 18 (1912), No. 6, pp. 366, 367).—The data here summarized indicate that idiosyncrasies observed in individuals with respect to different articles of diet may be attributable to hyper-susceptibility to the toxic action of proteids or other material.

The respiration calorimeter and its uses for the study of problems of vegetable physiology, C. F. LANGWORTHY and R. D. MILNER (*Jour. Biol. Chem.* 11 (1912), No. 2, *Proc.*, p. xxxiii).—A brief account is given of the use of the respiration calorimeter (*E. S. R.*, 25, p. 570) for the study of problems concerned with ripening fruit and of the construction of a new calorimeter specially designed for use in the study of such problems.

Nutrition laboratory, F. G. BENEDICT (*Carnegie Inst. Washington Year Book*, 10 (1911), pp. 183-197).—A brief description is given of the equipment, investigations in progress, publications, and work of the laboratory in general.

## ANIMAL PRODUCTION.

The influence of selection and assortative mating on the ancestral and fraternal correlations of a Mendelian population, E. C. SNOW (*Proc. Roy. Soc. [London]*, Ser. B, 85 (1912), No. B 578, pp. 195, 196).—"In general terms, it was established that the effect of taking a selected sample instead of a random one from a population showing a zero coefficient of assortative mating would be to find the ancestral and fraternal correlations within that sample less than those of a random sample, so long as the variability was diminished by the selection. If an ancestor be selected, the correlations between that ancestor and descendants diminish in geometrical progression. On the whole, selection of parents appears to affect the correlations between them and their offspring to a greater extent than it affects the relationship between those offspring themselves."

selves. For all ancestral cases the regressions appear to be more stable properties of a particular population than the corresponding correlations; frequently the regression of offspring on ancestor is the same as for a random sample though the correlation is changed. . . .

"The value 0.5 in each case for the fraternal and parental correlations obtained when random samples of a general Mendelian population are dealt with does not depend upon the fact that the samples are random ones, but upon the fact that for such a population the frequency of the heterozygote is twice the geometric mean of the frequencies of the dominant and recedent homozygotes. For, if any selected sample of the form  $p^2(AA) + 2pq(Aa) + q^2(aa)$  be taken from the general population  $p^2(AA) + 2pq(Aa) + q^2(aa)$ , the parental and fraternal correlations reached when the individuals of the selected sample mate at random within the sample always have the constant value 0.5. . . .

"Assortative mating within a random sample of the general population, if positive, increases the parental and sibling regressions as well as the correlations. The ancestral regressions diminish in geometrical progression, the correlations not perfectly, but nearly so. In certain cases the expressions found for the parental and sibling correlations were identical with those reached by the very general methods previously employed by Pearson, and which have no connection whatever with Mendelism, but this can hardly be more than a curious coincidence.

"[In] assortative mating within a selected sample, the regression of offspring on parent depends upon both the assortative mating and the intensity of selection, and increases as those factors increase. Selection and assortative mating affect the correlations in opposite directions, the decreasing tendency of the former appearing to have the predominating effect in practical cases. The sibling correlation is not raised so much by assortative mating nor reduced so much by selection as is the parental one.

"Fairly similar qualitative results were found throughout for somatic characters, though not so much weight can be given to them as to those for gametic characters. Moreover, it is the latter which agree most closely with observation. It is to the results for gametic characters, therefore, that we must look for theoretical verification for experimental conclusions which, at first sight, appear paradoxical, e. g., the closeness of the resemblance between cousins."

See also a previous article (E. S. R., 27, p. 175).

Mendel's principles of heredity, A. H. MARSH (*Jour. East Africa and Uganda Nat. Hist. Soc.*, 2 (1911), No. 3, pp. 52-60, pls. 2).—A popular exposition of Mendel's law, with special reference to applying it to the improvement of domesticated animals in East Africa.

Concerning the inheritance and the origin of species, J. GROSS (*Biol. Centbl.*, 31 (1911), Nos. 6, pp. 161-177; 7, pp. 193-214; *abs. in Zentbl. Allg. u. Expt. Biol.*, 2 (1912), No. 24, pp. 641, 642).—A criticism of the extreme views of the Mendelians.

On the changes in the cranial capacity caused by domestication, B. KLARR (*Sitzber. Gesell. Naturf. Freunde Berlin*, 1912, No. 3, pp. 153-179, figs. 9).—Measurements of skulls of wild and domesticated animals are given, with a discussion of the changes that have taken place. The cranial capacity of domesticated sheep, swine, and dogs was found to be smaller than that of closely related wild species.

The inheritance of the dun coat color in horses, J. WILSON (*Sci. Proc. Roy. Dublin Soc., n. ser.*, 13 (1912), No. 14, pp. 183-201).—Additional data E. S. R., 23, p. 476) are cited as a further illustration that dun is recessive to gray and roan, and dominant to brown, bay, black, and chestnut.

The nature of the inheritance of horns in sheep, T. R. ARKELL and C. B. DAVENPORT (*Science, n. ser.*, 35 (1912), No. 911, p. 927).—An explanatory note concerning the work of Castle previously noted (*E. S. R.*, 27, p. 370).

Is there association between the yellow and agouti factors in mice? A. H. STURTEVANT (*Amer. Nat.*, 46 (1912), No. 546, pp. 368-371).—Evidence is submitted to show that the ticking or the agouti factor is closely associated with the factor which produces yellow-haired mice.

Evidence of the zebra in the pleistocene fauna of France, S. TROTTER (*Science, n. ser.*, 33 (1911), No. 849, p. 539).—A study of the drawings in *L'Art pendant L'Age du Renne*, by Edouard Piette (Paris, 1907), leads the author to believe that the zebra lived in western Europe as a contemporary of the cave bear, woolly rhinoceros, and other animals depicted by paleolithic man.

Some current conceptions of the germ plasm, R. A. HARPER (*Science, n. ser.*, 35 (1912), No. 911, pp. 909-923).—This is an address made before the American Association for the Advancement of Science, 1911, and in which the recent studies on fundamental problems of cell behavior and heredity are reviewed. The author finds that the later researches strengthen the view that chromosomes are the bearers of hereditary traits, but that the attempt to express the results in terms of unit characters is but a relic of the earlier corpuscular and preformational theories of heredity.

On melanin, R. A. GOETNER (*Biochem. Bul.*, 1 (1911), No. 2, pp. 207-215).—A summary of work, wherein it is pointed out that the work of different investigators is not comparable because of the diversity of methods. The following conclusions are drawn:

"All available data indicate that the formation of melanin is brought about by the interaction of an oxidase and an oxidizable chromogen. Melanins are of at least 2 types, which may be differentiated by their solubility or insolubility in dilute acids. Those melanins which are soluble in dilute acids are of a protein nature, and for this type the name melano-protein is suggested. It appears probable that these melano-proteins are not present as granules, but that they are 'dissolved' in the keratin structure. The melanins which are insoluble in dilute acids are of an unknown constitution, and are, probably, the 'pigment granules' which may be seen in the hair and tissues. It is probable that they are formed by the oxidation of a different chromogen from that which yields the melano-proteins. The protein portion of the melano-protein molecule is readily decomposed by the action of alkalis or acids, and colored products are obtained which are not soluble in dilute acids. Tyrosin, lysin, and arginin have been identified among the hydrolytic products of a melano-protein. Sodium hydroxid solution decomposes the melanin molecule, and causes a loss of both nitrogen and hydrogen. As many different products as may be desired can be obtained by varying the strength of the alkali employed."

The origin of the melanotic pigment in the embryonic eye and in malignant tumors, A. VON SZILLY (*Arch. Mikros. Anat.*, 77 (1911), No. 2, I, pp. 87-156, pls. 4; *Abh. in Jour. Roy. Mikros. Soc. [London]*, 1912, No. 2, pp. 168, 169).—The author studied the eyes of several vertebrate embryos and melanotic tumors in the eye of man. The pigment bearers were found to arise from the chromatin of the nucleus and pass into the cytoplasm, being comparable to chromidia. Some are of a degenerative type, and their appearance is associated with a partial breakdown of the nucleus. The change of colorless pigment bearers into pigment is brought about by specific cell ferments, which act on the chromatin.

On melanin of animal origin, M. PIETTRE (*Compt. Rend. Acad. Sci. [Paris]*, 153 (1911), No. 17, pp. 782-785; *Abh. in Chem. Ztg.*, 35 (1911), No. 14, p.

1935).—From the sarcomatous tumors in horses the author isolated by acid hydrolysis a protein fraction and a more condensed jet-black nucleus insoluble in acids but easily soluble in alkalis.

**American Society of Animal Nutrition** (*Amer. Soc. Anim. Nutrition Proc.* 1911, pp. 37).—This contains the minutes of the annual meeting held in November, 1911 (E. S. R., 26, p. 197), including the president's annual address on Some Unsolved Problems, by H. P. Armsby (pp. 4-12), and the following papers; Methods in Nutrition Investigation, by E. B. Forbes (pp. 12-21); The Feeding Experiment: Its Improvement and Refinement, by H. J. Waters (pp. 21-28); and Animal Nutrition Investigations in the Bureau of Animal Industry, by G. M. Rommel (pp. 28-30).

**Analyses of fodder plants, grasses, and root crops**, J. C. BÜRNICH (*Ann. Rpt. Dept. Agr. and Stock [Queensland], 1909-10*, pp. 58-60).—Analyses are reported of Early Amber cane, *Sorghum saccharatum*, white and red Kafir corn, *Andropogon intermedius*, *A. affinis*, *Anthistiria avenacea*, *A. ciliata*, *Panicum bulbosum*, spring grass (*Erichloa punctata*), *Trysacum dactyloides*, *Erodium cymnorum*, *Atriplex halimoides*, *Medicago sativa*, *Lotus australis*, oaten chaff, oil cake, lupine silage, cowpea and sorghum silage, turnips, kohlrabi, swedes, mangolds, carrots, sugar beets, and kangaroo grass.

[Analyses of feeding stuffs], H. H. MANN (*Ann. Rpt. Dept. Agr. Bombay, 1910-11*, p. 62).—Analyses of several new fodders are reported, which include the following: Babul pods, water 5.5, ether extract 2.2, protein 11.63, soluble carbohydrates and tannin 59.3, fiber 16.47, and ash 4.9 per cent; and rice konda, water 8.23, ether extract 8.54, protein 32.89, soluble carbohydrates 37.72, fiber 4.9, and ash 7.72 per cent.

The rice konda consisted chiefly of the inner husk and germ obtained in grinding rice. It is thought that babul would form a nutritious fodder, except those varieties containing so large an amount of tannin that they are not relished by stock.

**Inspection and analyses of commercial feeding stuffs on sale in the State**, W. F. HAND ET AL. (*Mississippi Sta. Buls.* 153, pp. 31; 154, pp. 39).—Analyses are reported of wheat shorts, bran and middlings, corn chop, hominy feed, rice polish, rice bran, molasses feeds, and mixed feeds.

**Concentrated commercial feeding stuffs**, A. L. GARRISON (*Tenn. Agr.*, 1 (1912), No. 2, pp. 35-73).—Analyses are reported of alfalfa meal, wheat bran and shorts, linseed meal, cotton-seed meal, and proprietary mixed feeds.

**Molasses and molasses feeds**.—Composition and feed values of rice by-products, J. E. HALLIGAN (*Baton Rouge: La. Bd. Agr. and Immigr.*, [1912], pp. 20, fig. 1).—This is a popular discussion of the feeding value of molasses and rice by-products. Samples of rations for different farm animals are given.

**Animal breeding**, G. WILSDORF (*Tierzuchtung. Leipzig*, 1912, pp. 110, pls. 12).—This is a brief popular treatise on the feeding, breeding, and management of all kinds of live stock.

**Cattle in Latin America**, P. BERGÉS (*Trab. 4. Cong. Cient. Santiago de Chile*, 15 (1908-9), pp. 508-512, pls. 2).—This contains live stock statistics of the Latin American countries.

**The live-stock industry in the Department of Junin**, A. L. GARCÍA (*Bol. Dir. Fomento [Peru]*, 9 (1911), No. 5, pp. 1-44).—It is stated that this region is better adapted to sheep raising than to cattle raising. Data are given as to the amount of wool exported from Peru to different countries from 1903 to 1909, and the amount, value, and origin of imports of condensed milk, butter, and cheese during the years 1904 to 1909.

**The meat industry of Argentina**, J. E. RICHELET (*An. Soc. Rural Argentina*, 48 (1912), No. 2, pp. 160-201, figs. 28).—A general and statistical article.

Official enumeration of cattle in the Canton of Bern (*Mitt. Bern. Statist. Bur.*, 1911, No. 3, pp. 92).—This gives in detail the statistics of all kinds of live stock in Bern.

Live stock and products thereof (*Ann. Rpt. Dept. Agr. and Stock [Queensland]*, 1909-10, pp. 15-19, 135-148).—This contains general and statistical information on the live-stock industry in Queensland.

[Defrosting beef and mutton] (*Agr. Gaz. N. S. Wales*, 23 (1912), No. 3, p. 239).—A brief description of a process by which frozen meat is thawed in a chamber so constructed that the atmospheric pressure can be regulated and excess moisture extracted without breaking the tissues of the meat. It is claimed that beef and mutton thus treated compare favorably in appearance when placed on the market with prime English meat.

[British meat supplies], J. L. GRIFFITHS (*Daily Cons. and Trade Rpt. [U. S.]*, 15 (1912), No. 121, pp. 722, 723).—This contains statistics on imports of beef, mutton, and pork from different countries, showing how the decrease in imports of meat from the United States to Great Britain has been replaced by shipments from Argentina.

\* An industry that thrives on the utilization of waste, E. SCHENKEL (*Sci. Amer.*, 106 (1912), No. 24, pp. 538, 549-552, figs. 6).—A popular account of the use made of the by-products of the packing house.

Hides and sheepskins, E. J. SHELTON (*Agr. Gaz. N. S. Wales*, 23 (1912), No. 4, pp. 297-306, pls. 3, fig. 1).—This contains advice on skinning, curing, and marketing hides.

Sheep raising in southern Chile (*Times [London]*, 1911, June 27, *So. Amer. Sup.* No. 12, p. 3; *abs. in Internat. Inst. Agr. [Rome]*, *Bul. Bur. Agr. Intel. and Plant Diseases*, 2 (1911), No. 8-10, p. 2209).—A general and statistical account of the rapidly growing sheep industry in the southern part of Chile, which until recently was regarded as a desert.

Sheep and wool for the farmers, J. W. MATHEWS (*Agr. Gaz. N. S. Wales*, 21 (1912), No. 3, pp. 135-207).—Besides a general discussion of the cross-bred and the Merino, there is an account of the results obtained thus far at the Wagge experimental farm.

The pastoral age in Australasia, J. COLLIER (*London and Melbourne*, 1911 pp. XI+345, pls. 16).—A popular history of the sheep industry in Australia.

The economic importance of the South American Camelidae, D. DAVIS (*Trab. 4. Cong. Cient. Santiago de Chile*, 15 (1908-9), pp. 234-240).—This discusses the value of the llama, alpaca, vicuña, and guanaco as domesticated animals.

Profitable pig breeding and feeding, T. ALLEN (*London*, 1910, pp. XI+194 pls. 9, figs. 24).—A practical treatise on the feeding, breeding, and management of swine, written for the purpose of promoting the industry in Great Britain.

Fattening hogs in Nebraska, W. P. SNYDER (*Nebraska Sta. Bul.* 124, p. 5-71).—The material in this bulletin has been previously noted (*E. S. R.*, 2, p. 874), additional technical details being here given.

Slaughter trials with swine, N. O. HOFMAN-BANG ET AL. (*Ber. K. Vet. o Landbohøjskoles Lab. Landøkonom. Forsøg [Copenhagen]*, 77 (1912), pp. 35).—Transportation trials with pork were made in a refrigerator car and in a common freight car, with hay or sawdust mattresses 3 in. thick laid on the floor and placed around the walls of the car. The air temperature at the time of loading was 19.5° C. The temperature of the pork in the refrigerator car was 8.3° at loading and at the end of the journey. The average temperature of the pork when placed in the common freight car was 8.7°, and at the end of the 40-hour journey it had risen to 12.3°. For this limited period it is, therefore

concluded that it is practical to ship pork in freight cars in the manner indicated.

Experiments are also reported with different methods of piling pork during the salting process, and with salting hard and soft pork. The latter trials show that soft pork takes up more brine by injection than hard pork, but during the salting process the soft pork shrinks more, so that there will be from  $\frac{1}{2}$  to over 2 per cent more salted hard than soft pork.

Pig clubs in England and Wales in 1910 (*Jour. Bd. Agr. [London]*, 19 (1912), No. 3, pp. 203-209).—This contains data on the cooperative societies for insuring pigs. There are over 1,000 of these in England and Wales, 32 of which are registered.

Kemerton and Overbury pig club (*Jour. Bd. Agr. [London]*, 19 (1912), No. 3, pp. 209-214).—Statistics are given of a cooperative society for insuring pigs which has been in operation for 25 years.

The feeding of the horse, E. LAYLAUD (*L'Alimentation du Cheval*, Paris, 1912, pp. 164).—A general treatise on this subject which gives recent results of investigations that can be applied by the practical horse feeder.

The Przewalskii wild horse, E. WEBER (*Ztschr. Tiermed.*, 16 (1912), No. 5, pp. 179-192, fig. 1).—A discussion of the characteristics of *Equus przewalskii*, which the author considers to be the sole ancestor of the domesticated horse. A bibliography is appended.

The half-bred in Ireland: Hunters, hacks, and army horses, E. MEULEMAN (*Le Demi-Sang en Irlande: Hunters, Hacks et Troupiers*, Paris, 1910, pp. XI+139, pls. 32).—An account of the past and present conditions of horse breeding in Ireland.

The Argentine polo ponies (*Country Life [London]*, 31 (1912), No. 806, pp. 19\*, 20\*, figs. 4).—This discusses the type of Argentine ponies which has been recently introduced into England.

Certification of stallions, W. A. N. ROBERTSON (*Jour. Dept. Agr. Victoria*, 10 (1912), No. 5, pp. 288-315).—This reports the results of the fifth stallion registration in Victoria, and also states the regulations under which the animals are registered.

Castration of the stallion standing by means of the ecraseur, J. J. EDGAR (*Agr. Jour. Union So. Africa*, 3 (1912), No. 4, pp. 486-491, figs. 6).—Directions are given for castration, based on the results of many years' experience.

Cattle dogs and sheep dogs, R. KALESKI (*Dept. Agr. N. S. Wales, Farmers' Bul.* 38, 1910, pp. 15, pls. 4).—A discussion of the requirements of good cattle and sheep dogs, and a description of the varieties in New South Wales.

Proper temperature for artificial incubation, S. COVALT (*Rel. Poultry Jour.*, 19 (1912), No. 5, pp. 785, 832).—The rectal temperature of the fowls examined was as follows: Cockerels, range 105.2 to 107°, with an average of 106.8°; laying hens and pullets, range 104.8 to 107.8°, average 106.6°; sitting hens, range 105 to 107.4°, average 106.1°. The inside temperature of eggs under a sitting hen at the end of 3, 6, 7, and 24 hours was 100°, at the end of a week 101°, at the end of 2 weeks 102.4°, and on the eighteenth day 102°. When a thermometer was hung on a hook in the incubator and kept at 103°, the inside temperature of the eggs after 24 hours' incubation was only 97°. When the thermometer was placed on the eggs and kept at 103°, the inside temperature of the eggs was approximately that of eggs under the hen.

"There is not much change in the temperature of the live chick in the egg after the end of the second week. And in the incubator the live chicks in the eggs showed an average of 102.4° at the end of the eighteenth day with the thermometer running at 103° on the eggs. I consider that the safest and best

place from then on for the thermometer would be hanging on hooks above the eggs and not more than  $\frac{1}{2}$  in. away from them, running a temperature of 103.5 to 104° at hatching time.

"These experiments bring us, I believe, as near as any possible way can to finding the proper temperature at which to run the incubator. One hen had a temperature of 105.4°, and I always found her eggs, on an average, 2° lower than the others. On examining the chicks in these eggs I found they, without exception, showed improper development."

Poultry keeping in Egypt, W. H. CADMAN (*Agr. Jour. Egypt*, 1 (1912), No. 2, pp. 66-89).—A brief summary of the poultry industry in Egypt as compared with that of other countries.

The long-tailed Japanese fowl, F. L. SEWELL (*Rel. Poultry Jour.*, 19 (1912), No. 5, pp. 775, 802, 803, figs. 9).—A description of the characteristics of this breed of fowl. It is suggested that as the supply of plumage of wild birds is decreasing, it will be profitable to raise this fowl as the long plumes will find a ready sale with milliners.

Experiments with ostriches, J. E. DUERDEN (*Agr. Jour. Cape Good Hope*, 37 (1910), No. 5, pp. 512-517; *Agr. Jour. Union So. Africa*, 1 (1911), Nos. 1, pp. 29-37, pls. 8; 3, pp. 348-351; 3 (1911), Nos. 1, pp. 22-29; 3, pp. 352-356, figs. 2; 4, pp. 492-507, figs. 5; 5, pp. 625-638, figs. 5).—A continuation of earlier work (E. S. R., 24, p. 380).

The plumages of the ostrich, J. E. DUERDEN (*Ann. Rpt. Smithsonian Inst.*, 1910, pp. 561-571, pls. 8).—This is a reprint of a portion of the work noted above.

Shellfish industries, J. L. KELLOGG (*New York, 1910*, pp. XVII+361, pls. 16, figs. 33).—A popular work on the oyster, soft clam, hard clam, and scallop, written for those interested in their culture or who may have an interest in the biological problems involved in their artificial control.

## DAIRY FARMING—DAIRYING.

Report of the Fifth International Dairy Congress (*Compt. Rend. 5. Cong. Internat. Lait. [Stockholm]*, 1911, pp. 176, pl. 1).—This is a complete report of the proceedings and papers read at the International Dairy Congress, held at Stockholm, June and July, 1911.

Norwegian dairy industry, P. E. TAYLOR (*Daily Cons. and Trade Rpts. [U. S.]*, 15 (1912), No. 137, pp. 1041-1043).—A brief report on the recent development of the dairy industry in the Stavanger consular district, where most of the creameries are on the cooperative plan and in a profitable condition. A large amount of cheese and butter is exported. The growth of the industry has opened the market for several kinds of American machinery, such as mowing machines, ensilage cutters, dairy appliances, etc.

The production of milk in Italy, BIGNAMI (*Villaggio*, 36 (1911), No. 1326, p. 313; *abs. in Internat. Inst. Agr. [Rome]*, *Bul. Bur. Agr. Intel. and Plant Diseases*, 2 (1911), No. 8-10, p. 2224).—Information regarding the production of milk, butter, and cheese from cows, sheep, and goats in Italy.

Half yearly exports of milk and dairy products from Italy (*Statist. Import e Export. [Italy]*, 1911, Jan.-June, pp. 315; *abs. in Internat. Inst. Agr. [Rome]*, *Bul. Bur. Agr. Intel. and Plant Diseases*, 2 (1911), No. 8-10, p. 2225).—Data on milk, butter, and different varieties of cheese exported from Italy in the years 1909-1911.

[The dairy industry of Tasmania], H. D. BAKER (*Daily Cons. and Trade Rpts. [U. S.]*, 15 (1912), No. 128, p. 851).—This contains notes on the present condition of the industry. At present about 53,000 cows are kept for dairy purposes. The output of the registered factories during the year ended June

30, 1911, was 2,815,680 lbs. of butter, valued at \$611,719, and 423,920 lbs. of cheese, valued at \$51,487. Most of this cheese and butter was sent to England, via Melbourne.

[Dairying] (*Ann. Rpt. Dept. Agr. and Stock [Queensland], 1909-10, pp. 24-31, 47, 63*).—This consists of reports on dairy legislation, inspection of dairy products, and testing glassware, and analyses of butter.

Results of the Douglas County cow testing association, A. L. HAECKER and J. H. FRANDSEN (*Nebraska Sta. Bul. 129, pp. 3-15, figs. 6*).—A summary is given of records of a cow-testing association which included 21 herds and 435 cows. Comparisons are drawn between the best and the poorest cows in each herd. The 10 most profitable cows showed a total profit of \$1,032.88, as compared with \$57.82 made by the 10 poorest cows. One cow returned only 55 cts. for each dollar of feed consumed. The best cow returned \$4.17.

Cooperative cow insurance societies in 1910 (*Jour. Bd. Agr. [London], 19 (1912), No. 2, pp. 116-124*).—This reports the number of members, number of animals insured, amount of claims paid, and other data of the 22 cooperative cow insurance societies in England and Wales.

Hand milking, and method of reducing and regulating, P. BERGÉS (*Ann. Soc. Rural Argentina, 46 (1912), No. 2, pp. 127-159, figs. 18*).—A discussion of the advantages of using milking machines, based principally on the results of their use in foreign countries.

On the cost price of milk in France (*Rev. Sci. [Paris], 49 (1911), II, No. 13, p. 409; abs. in Internat. Inst. Agr. [Rome], Bul. Bur. Agr. Intel. and Plant Diseases, 2 (1911), No. 8-10, p. 2223*).—The average cost of milk production in the Department of Yonne is stated to be 0.215 franc per liter (about 3.9 cts. per quart) for small herds and 0.188 franc per liter for large herds.

Milk in India, R. J. BLACKHAM (*Jour. Roy. Army Med. Corps, 16 (1911), No. 2, pp. 187-191*).—The average of 402 analyses of cow's milk gave the following results: Specific gravity 1.03244, total solids 13.303 per cent, and fat 4.286 per cent. Buffalo's milk was found to contain less fat than most of the analyses which have been previously reported. The average of the analyses of 124 samples resulted as follows: Specific gravity, 1.03404, total solids 15.98, and fat 5.98.

The influence of freezing on the composition of milk, C. MAI (*Molk. Ztg. Berlin, 22 (1912), No. 18, pp. 207, 208; N. Y. Produce Rev. and Amer. Cream., 34 (1912), No. 6, p. 262*).—Chemical and physical constants of a number of tests with frozen milk are reported.

In one case a 10-qt. can, kept at a temperature of 21° F. from 6 p. m. to 9 a. m., formed a layer of ice on the inside about the thickness of a finger. The can was then closed and left until the next morning. The upper layer was frozen "foamy leafy," and could be removed with a spoon. After about 4 qt. of the unfrozen liquid in the center was withdrawn, as well as the upper layer, the ice coat on the sides was thawed at 63°, and all remixed. The results of analyses are given in the following table:

Chemical and physical constants of milk partially frozen at 21° F.

	Specific gravity.	Refraction number.	Fat.	Solids-not-fat.	Acidity.
			Per cent.	Per cent.	Per cent.
The original milk.....	1.0317	38.5	3.4	8.37	6.5
Upper loose ice.....	1.0233	37.5	11.1	8.57	.....
Old ice on sides.....	1.0165	28.0	3.2	4.92	.....
Liquid in the center.....	1.0334	52.2	2.0	13.85	.....
It remixed.....	1.0321	38.5	3.3	8.95	7.3



In another case the milk was chilled to 32°, and placed in the open air at a temperature of from 4° above to zero for 30 hours. A small sample was kept unfrozen in an ice-box to control the acidity. The can appeared as before, and after separating and testing the various parts they were left for 3 days at about 39° to thaw and be remixed. The results were as follows:

*Chemical and physical constants of milk partially frozen at 4° F.*

	Specific gravity.	Refraction number.	Fat.	Solids-not-fat.	Acidity.
			<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
Original milk.....	1.0318	38.6	3.7	8.94	0.2
Upper layer (0.6 qt.).....	1.0256	40.2	11.6	9.30	8.2
Liquid center (2.5 qt.).....	1.0534	53.5	3.3	14.17	11.0
Solid ice on sides (7 qt.).....	1.0201	30.1	2.9	5.75	3.6
Remixed.....	1.0320	38.7	3.6	8.97	7.2
Unfrozen control.....		38.6			7.0

The milk was not changed by freezing in any manner perceptible to smell or taste, nor to the peroxydase reaction. The author warns the police inspectors to be careful in taking samples of milk in frosty weather, and suggests prohibiting the sale of partially frozen milk.

[A froth dispeller] (*Dairy*, 23 (1911), No. 276, p. 325, fig. 1; *N. Y. Produce Rev. and Amer. Cream.*, 33 (1912), No. 21, p. 884).—A description is given of a centrifugal machine for separating air from milk and milk froth.

In appearance it resembles the Alfa separator. The milk in its attempt to leave the bowl encounters paddle-shaped ribs in the space between the disks and is sent through this space in a thin layer out of the bowl into the cover, which it leaves by an outlet therein. The air which is separated from the milk escapes from the bowl by passing out of the bottom disk and ascends into the atmosphere. As the milk leaves the machine at a considerable force it can be elevated, if desired, over a cooler without the aid of a pump. The air is prevented from issuing with the milk by means of a regulating tap attached to the milk outlet pipe.

When separating pasteurized milk the froth dispeller is arranged to receive the milk from the pasteurizer and feed it to the separator. When cooling pasteurized milk the froth dispeller receives the milk from the pasteurizer and elevates it over the cooler.

Is it a menace to humans to drink milk obtained from cows affected with tuberculosis of the udder? E. UNGERMANN (*Tuberkulose Arb. K. Gesundheitsamt*, 1912, No. 12, pp. 213-264).—In some cases no traces of tuberculosis could be found in people who were accustomed to use tuberculous milk, though in other instances the results were affirmative. The conclusion is reached that tuberculous milk is a source of infection, but that a still greater danger is the contraction of the disease from human tuberculous patients.

Report from the bacteriological department, 1911-12, J. GOLDING and W. SADLER (*Midland Agr. and Dairy Col. Bul.* 8, 1911-12, pp. 67-78).—This consists of brief notes on defects of milk and milk products.

*Bacillus lactis viscosus* was found to be the cause of a sample of ropy milk. A copper taint in milk was due to the use of a cooler from which the tin had been largely worn off. A burnt taste in milk was traced to the presence of *Bacterium lactis acid.* Milk sold as sterilized had turned yellow and was found to contain a spindle-shaped organism, forming large spores quite resistant to heat. A yellow discoloration of Stilton cheese was ascribed to the presence of an abnormal amount of tyrosin.

South Italian cheeses, C. BESANA (*Ann. R. Staz. Sper. Caseif. Lodi*, 1910, pp. 49-78; *abs. in Internat. Inst. Agr. [Rome]*, *Bul. Bur. Agr. Intel. and Plant Diseases*, 2 (1911), No. 8-10, pp. 2230, 2231).—Descriptions are presented of the principal varieties of cheese as made in southern Italy.

The most popular variety is Pecorino, made of ewe's milk. Among the types of cow's milk cheeses are Provolone, a good table cheese, Caciocavallo, which is often used for grating, and Scamorze, a small salted cheese, which is consumed locally. Although good cheeses are made for home consumption, they are not an important commercial product. Provature, or Provole, and Mozarella cheeses are made from buffalo milk. Many cheeses from mixed milk are made and consumed locally. Manteche is whey butter, covered with a thin layer of cheese.

Yellow discoloration of Stilton cheese, J. GOLDING (*Jour. Bd. Agr. [London]*, 19 (1912), No. 3, pp. 177-186, pl. 1).—This discusses the losses caused by a yellow discoloration of Stilton cheese, and reports the results of the investigations to determine the cause.

Twenty-four cheeses were made under control conditions, with the result that those containing a large amount of salt seemed to favor the yellow discoloration, but evidently this was not the only factor. Negative results were obtained with pure cultures of bacteria. The injection of tyrosin into the normal cheeses produced discoloration, and therefore is thought to be the limiting factor. Salt is also thought to favor the accumulation of tyrosin because it retards the action of enzymes that might destroy tyrosin formed during ripening. To avoid this defect cleanliness should be observed, especially in the preparation of the rennet, so that unfavorable types of bacteria or other active agents which influence the formation of tyrosin may be excluded.

## VETERINARY MEDICINE.

Report of the veterinarian for the State of Pennsylvania, S. H. GILLILAND (*Ann. Rpt. Penn. Dept. Agr.*, 16 (1910), pp. 136-195).—This is a report for the year 1910 with reference to the meat inspection service, meat markets, slaughterhouses, diseases of live stock, a report of the bacteriological laboratory, results obtained in the eradication of tuberculosis (noted on page 481), the diagnosis of rabies (noted on page 479), and microscopical examinations of miscellaneous materials.

Annual report for 1911 of the principal of the Royal Veterinary College, J. MCFADYEN (*Jour. Roy. Agr. Soc. England*, 72 (1911), pp. 347-362).—The diseases reported upon are anthrax, glanders, hog cholera, foot-and-mouth disease, parasitic gastritis in sheep, and tuberculosis.

Annual report of the Punjab Veterinary College and of the Civil Veterinary Department, Punjab, for the year 1910-11, S. H. GAIGES and V. DE V. H. FODLEY (*Ann. Rpt. Punjab Vet. Col. and Civ. Vet. Dept.*, 1910-11, pp. 14+11).—This annual report includes accounts of the occurrence of equine and ovine contagious diseases, breeding operations, etc.

Report of the government bacteriologist, C. J. POUND (*Ann. Rpt. Dept. Agr. and Stock [Queensland]*, 1910-11, pp. 62-68, pl. 1).—This report consists largely of a discussion of tick fever and its prevention by inoculation. The parasite *Chocerca gibsoni* is reported to have been found during the early part of the year in sheep, an animal which hitherto was not suspected of harboring this parasite.

Surgical and obstetrical operations, W. L. WILLIAMS (*Ithaca, N. Y.*, 1912, ed., rev. and enl., pp. XII+240, pls. 40, figs. 18).—A third revised and enlarged edition of this work (E. S. R., 15, p. 719).

Practical and scientific horseshoeing, F. G. CHURCHILL (*Kansas City, Mo.*, 1912, pp. 127, pls. 7).—A small handbook.

Subject and author index to *Centralblatt für Bakteriologie, Parasitenkunde und Infektionskrankheiten*, E. RIEHM (*Centbl. Bakt. [etc.]*, 2. Abt., *General-Register für die Bände 21-30*. Jena, 1911, pp. 393).—This is the author and subject index of this publication for volumes 21 to 30, inclusive.

The bacterial cell, A. MEYER (*Die Zelle der Bakterien*. Jena, 1912, pp. VI+285, pl. 1, figs. 34).—This is a comparative and critical compilation of the knowledge in regard to the bacterial cell, and is meant for botanists, zoologists, and bacteriologists.

On the transmission of immunity from mother to offspring.—A study upon serum hemolysins in goats, F. W. FAMULENER (*Jour. Infect. Diseases*, 10 (1912), No. 3, pp. 332-368).—"To summarize briefly the principal results of the experiments, it was found that goats actively immunized against sheep blood corpuscles during gestation passively transmitted the specific hemolysin to their young. Colostrum was the chief agent in bringing about the passive immunization of the suckling. Sucklings which got the colostrum and first milk rapidly acquired a relatively high antibody content in their blood, which was well retained. When the immunization was done during the period of gestation the colostrum contained a high content of specific hemolysin, often much higher than the adult's serum at time of parturition. The hemolytic antibodies rapidly disappeared from the milk after the mother had been suckled by the young. The blood taken from the newly born before they were permitted the antibody colostrum showed no appreciable amount of hemolysin by the test used. The placenta played a minor rôle in the passage of hemolysins to young before birth, practically negligible in most cases. Mother goats, actively immunized against sheep blood corpuscles immediately after birth of their young, failed to transmit any demonstrable immunity to their suckling young. The milk, in some cases, contained no demonstrable hemolysins, but in others showed fairly large amounts. Apparently a very high degree of immunity is necessary before appreciable amounts of antibodies are excreted through the milk. Older sucklings apparently did not absorb the antibodies in an unchanged condition. The young animals (kids) did not respond to any extent in production of hemolysins following subcutaneous injections of foreign blood cells (sheep)."

The production and valuation of curative sera, K. E. BOEHNCKE (*Ztschr. Angew. Chem.*, 25 (1912), No. 18, pp. 865-870).—A simple and concrete discussion of the facts pertaining to the production and testing of curative sera.

The optical method and its use in serum diagnosis, H. MIESSNER and K. B. IMMISCH (*Mitt. Kaiser Wilhelms Inst. Landw. Bromberg*, 4 (1912), No. 3, pp. 160-187, fig. 1).—This is a study of the optical behavior of normal and abnormal sera from various animals. The changes produced in the rotation as observed in the polariscope by silk-normal serum and glanders serum peptones and glanders bacilli extracts in a mixture with the serum of diseased horses were very atypical and did not greatly differentiate themselves from the value obtained for the sera from normal animals. Therefore the optical method is not considered an efficient method for diagnosing disease, especially where glanders is concerned and peptone mixtures are employed.

Dipping and tick destroying agents, H. WATKINS-PITCHFORD (*Agr. Jour. Union So. Africa*, 2 (1911), No. 1, pp. 33-79, pls. 2, figs. 4).—This is a report of dipping experiments, etc., with the brown tick (*Rhipicephalus appendiculatus*), which transmits the virus of East Coast fever, conducted in continuation of those previously noted (*E. S. R.*, 24, p. 393). The investigations reported include the following subjects: Shortest periods for engorgement of the larva

and nymph of the brown tick; details of adjustment of the 3-day dip; lethal effects of 3-day and laboratory dips on distended female brown ticks; the effect of 3-day dips at intervals of 72 hours upon adult tick life generally; the lethal effect of dips ( $\frac{1}{2}$  and  $\frac{2}{3}$  strengths) at intervals of 48 hours, showing the increase of efficiency resulting from the addition of soap and paraffin; details for preparation of 3-day dipping fluid; details for preparation of 3-day ear dressing; tick migration experiment; relative tick activity during day and night; residual effect of 3-day dip in horses and cattle; the agency of the tail tuft in the collection of ticks; the suitability of 3-day dip in the treatment of scab in sheep; effect of weekly dipping process with laboratory dip upon secretion of milk; a description of the isometer devised by the author for use in the estimation of the exact percentages of arsenic present in different samples of dipping fluid. On the blood parasites found in animals in the zoological gardens during the four years 1908-1911, H. G. PLIMMER (*Proc. Zool. Soc. London*, 1912, II, 406-419, pls. 7).—During a period of 4 years the author examined the blood of every mammal, bird, reptile, and batrachian, which died in the zoological gardens, a total of 6,430 individuals. Blood parasites were found in 447, or 6.97 per cent; these animals representing 256 species. The results are reported in detail.

Amebae as the cause of disease in domestic animals, E. LEHMANN (*Centbl. Bak. [etc.], I. Abt., Orig.*, 62 (1912), No. 7, pp. 589-605, figs. 14).—A brief review first presented is followed by a report of studies of amebic dysentery in horses, amebae in the walls of the fore-stomachs of bovines, and amebae colitis in the intestines of sheep. A bibliography of 61 titles is appended.

A contribution to the pathogenesis of *B. abortus*, Bang, II, M. FÄRMAN (*For. Med. Research*, 28 (1912), No. 3, pp. 441-487, pls. 7).—In the first part of this paper (E. S. R., 26, p. 598) the author presents a historical review of investigations of the etiology of contagious abortion. A report of investigations of the disease produced by inoculating guinea pigs follows.

"*Bacillus abortus* may be said to cause lesions in guinea pigs of a practically instant and most remarkable character. These usually appear between the third and sixth week (within 10 days as determined in sections by the microscope), acute changes extending over a period of 10 to 20 weeks, after which reparative processes appear. The disease is accompanied by fever and tends toward recovery, though the animal may die from rupture of the spleen, emaciation, and exhaustion.

"All the tissues of the body may be attacked with the exception of the testes. This universality and frequency is best seen in sections under the microscope, as only the far advanced lesions are recognized by the unaided eye. In the tissues involved and in the histological changes produced, the disease closely resembles tuberculosis. The lesions have a predilection for the perivascular and subcapsular regions of the various organs. Injections cause at first a profound disturbance of the circulation in certain organs, notably the spleen, which becomes enormously engorged. Intra-abdominal inoculations are frequently followed by adhesions about the spleen. The localization of the disease in the testicle as well as in other organs, even when *B. abortus* is inoculated subcutaneously, is quite remarkable. The proliferation of bone although not common is extraordinary when present."

Inoculations led the author to conclude that it is highly probable that *B. abortus* produces lesions in mice.

The cultivation of *B. abortus* is described at length: "The cultural characteristics of this organism are quite constant when once its ability to grow on artificial media has been established. Among these characteristics may be

mentioned the glistening iridescent colonies on agar and the variation in their size; the colonies on and the nonliquefaction of gelatin; the slow growth in bouillon; the conspicuous pigmented growth on potato; and the organism's inability to ferment dextrose, succharose, or lactose, or to produce acid.

Infectious abortion in bovines, ZWICK (*Deut. Tierärztl. Wchnschr.*, 18 (1911), No. 51, pp. 781-785; also, in *Ztschr. Immunitätsf. u. Expt. Ther.*, II, Bd. 5 (1912), No. 1, p. 855).—This work, a portion of which has been previously noted (*E. S. R.*, 24, p. 785), shows that the serum of cows which have aborted, taken at the time or shortly after, will agglutinate in a titer of from 1:100 to 1:10,000, while normal animals' serum will never agglutinate over a titer of 1:100. A complement fixation test is obtained with the serum of cows which aborted, in amounts of from 0.01 to 0.001 cc., while the serum of normal animals requires amounts varying from 0.02 to 0.1.

As the abortion bacillus when taken with the food will also produce specific antibodies, and the immune bodies remain for a long time in the serum, this finding will only show that the animals are or were infected. Abortin prepared according to procedures used for producing tuberculin does not yield constant results. It is possible to produce highly active immune serum, and active immunization is possible, although the author believes it is a good procedure to combine the active immunization process with immune serum injections.

Contribution to Ascoli's precipitant diagnosis of anthrax, F. BROWER (*Mitt. Kaiser Wilhelms Inst. Landw. Bromberg*, 4 (1912), No. 3, pp. 243-247).—After pointing out the fact that Ascoli's serum often gives a slight ring when testing with material free from anthrax, as noted by Markoff (*E. S. R.*, 27, p. 182), the author reports several cases in which a negative reaction was obtained with positively anthracic material. The method could not be employed for detecting anthrax bacteria or spores in foodstuffs.

Tests and observations of methods for combating foot-and-mouth disease, R. KRONACHER (*Deut. Landw. Tierwacht*, 18 (1912), No. 11, pp. 123-125).—The preparations used in these tests were Kraff's vaccine (for protective and curative treatment), Hoffmann's euguform (for treating animals already diseased), euformal, which is a chemical combination of 18 per cent of formaldehyde and 82 per cent of dextrin (for preventing infection), antiformin, pyoktanin, acetic acid and clay, and mitisoi. None of these preparations gave very satisfactory results, with the possible exception of pyoktanin, which when used in connection with acetic acid and clay, gave fair results.

Serum diagnosis of glanders and other animal diseases, J. R. MOHLER (*Rep. U. S. Live Stock Sanit. Assoc.*, 15 (1911), pp. 165-172).—A discussion of the mallein reaction, complement fixation test, and the combined complement fixation and agglutination test, accompanied by a report of the results obtained in the various States. The combined test is the one recommended. See also a previous note (*E. S. R.*, 27, p. 183).

Observations and investigations of infectious osteitis and osteomyelitis in the ox and horse, A. BAUMGARTNER (*Schweiz. Arch. Tierheilk.*, 52 (1911), No. 3, pp. 107-123, pls. 4, figs. 3).—The author's observations and investigations have led to the following conclusions:

There is in the horse and bovine a very painful osteitis and osteomyelitis caused by the necrosis bacterium alone or in symbiosis with a gram-positive coccus. It results in an uninterrupted motor disturbance of the most varied type, a skeletal lameness, an increased pulse rate, and often somewhat fever, but without affecting the appetite. In some cases abscess formation follows. The disease has a very destructive effect upon the bones without reactive osteophyte formation, therefore hypertrophy of the bone is never observed. The course is mostly slow and long continued. Iodin preparations have a

highly curative effect. Hitherto this disease has occasionally been classed with rheumatism.

The dissemination and action of the *Pentastomum tanzoides*, S. von RÁTZ (*Allgemeines Lapok*, 34 (1911), No. 41, pp. 485-488; *abstr. in Berlin. Tierärztl. Wochenschr.*, 28 (1912), No. 8, p. 141; *Vet. Rec.*, 24 (1912), No. 1236, pp. 532, 533).—The adult of *P. tanzoides* lives in the nasal cavities of the dog, wolf, and fox, and is also found in the same position in herbivora. "The larvae occur in the thoracic and abdominal viscera, for the most part in the liver, lungs, and mesenteric lymphatic glands, and are often found free in the pleural and peritoneal cavities of the hare, guinea pig, goat, sheep, horse, ox, pig, deer, cat, etc., in addition to those of man. . . . The ripe ova pass out from the host's nose or to plants, and with them into the stomach of (usually) herbivora. Here the embryos, and later the larvae, penetrate the intestinal wall into the blood and lymph vessels, and pass in these to the different organs, where the larva (formerly known as *L. serrata* or *P. denticulatus*) develops further. Afterwards it becomes encysted or wanders farther into the serous cavities. The author's results do not support the view formerly held of the active wanderings of the *Lingulatus* in the bronchi."

"Infection in carnivora occurs as follows: Carnivorous animals take up the larvae of the parasite with the lungs, liver, etc., which they devour. The larvae wander from the stomach through the esophagus into the mouth, and thence into the nasal cavity. Moreover, when infected food is swallowed, single free larvae may adhere to the palate and from there migrate into the nasal cavity. Finally, the author has experimentally proved that animals may acquire young *Lingulatus* in their nostrils by smelling at organs containing larvae."

"When in the nasal cavities the parasite causes bleeding. More rarely it occasions violent inflammation and nervous symptoms resembling those of rabies."

The diagnosis of rabies, J. REICHEL (*Ann. Rpt. Penn. Dept. Agr.*, 16 (1916), pp. 173-185).—The usual history, symptoms, gross appearance after death, laboratory examination, animal inoculation test, microscopic examination, and rules regulating the examination and diagnosis are considered.

Investigations of and tick eradication in Rocky Mountain spotted fever, T. B. McCLENNAN (*Pub. Health and Mar. Hosp. Serv. U. S., Pub. Health Rpts.*, 27 (1912), No. 20, pp. 732-760).—The work of eradicating the Rocky Mountain spotted fever tick, conducted in cooperation with the State Board of Health of Montana, was begun May 26, 1911, an infected territory of about 8 square miles in the Bitter Root Valley, located about 3 miles from Victor, Mont., being selected for the work. A concrete dipping vat was constructed and 116 horses, 190 cattle, and 108 sheep were dipped and 155 redipped. Some 3,405 small wild animals, of which 3,233 were ground squirrels, were killed by shooting and trapping, and in addition many were killed by poison or carbon bisulphid.

"Out of a total of 4 badgers that were experimented with only 1 of them was found susceptible to infection with spotted fever, and of 5 guinea pigs that were inoculated with blood taken from this badger at 3 different times only 1 of them developed spotted fever. . . . The results with experiments of infecting 5 coyotes and 4 domestic cats were negative. . . . Only 2 weasels were experimented with, 1 of which was experimentally infected with spotted fever while the results obtained in the case of the other were negative but not conclusive." In a search made for the infection of spotted fever among ground squirrels in nature the results were negative.

\* Rhesus monkeys and guinea pigs were infected with spotted fever and treated with different drug preparations, namely, Salvarsan, sodium cacodylate,

and urotropin. The results obtained, however, do not indicate that any of these drugs possess any value whatever either as a prophylactic or in the treatment of spotted fever, but on the contrary their administration seems on the whole rather to intensify the severity of the disease in the animals as compared with the course of the disease in the controls."

A bibliography of 76 titles is appended.

Agglutination, precipitation, and complement fixation as an aid for diagnosing trypanosome diseases, especially dourine (Beschläsench), WINKLER and S. WYSCHESSEY (Berlin, *Tierärztl. Wchnschr.*, 27 (1911), No. 51, pp. 933-936).—The above mentioned reactions can be used for diagnosing these conditions.

[Transmission of *Trypanosoma hippicum*] (Rpt. Dept. Sanit. Isthmian Canal Com., 1912, Feb., pp. 41-43).—Experiments here reported "indicate very positively that *T. hippicum* can penetrate the mucosa of mules, which in the mouth and vagina is much thicker in proportion to the length of trypanosome than that of guinea pigs and rats used in other experiments, and it is assumed from this that murrina may be transmitted during copulation."

[Investigations of *Trypanosoma hippicum*] (Rpt. Dept. Sanit. Isthmian Canal Com., 1912, May, pp. 41-43).—"A strain of *T. hippicum* that had survived in a guinea pig the exceptionally long period of 336 days showed upon sub-inoculation on the two hundred and seventy-ninth and three hundred and thirty-sixth days very feeble pathogenic powers when compared with all other strains and with the same strain at an earlier period of the infection in the guinea pig."

Diagnosis, prevention, and treatment of tuberculosis, S. J. BOKARSKA (*Diagnóstico, Prevención, y Curación de la Tuberculosis*. Mexico, 1911, pp. 44, figs. 23).—This is a general summary of the methods of diagnosing, preventing, and treating tuberculosis in animals. Mexican conditions are considered in particular.

The relation between human and animal tuberculosis, H. KOSSLER (Dtsch. Med. Wchnschr., 38 (1912), No. 16, pp. 740-744).—In an address before the Seventh International Tuberculosis Congress, held at Rome, the author maintains that the greatest source of infection for pulmonary tuberculosis in man is man himself, particularly because the human type of bacillus is almost always present. Very little tuberculosis has its origin from the consumption of milk and meat obtained from tuberculous animals. Therefore, when combating tuberculosis as a national disease it is necessary to direct efforts principally to human infection.

In regard to bovine and human tuberculosis, J. OSTH (*Sitzber. K. Preuss. Akad. Wiss.*, 1912, VII, pp. 155-179).—A critical and historical discussion. Great stress is laid upon the point that tuberculosis in the human race can never be eliminated as long as the bovine type of the bacilli is conveyed from animal to man.

Differentiating the human type of tubercle bacillus from the bovine type by cutaneous injection of the guinea pig, E. TOMARKIN and S. PRSCHÉ (Dtsch. Med. Wchnschr., 38 (1912), No. 22, pp. 1032-1034).—More skin infections were obtained (through shaved but intact skin) with the bovine type of bacillus (26 out of 26 animals) than with the human type (7 out of 52 animals). The method can therefore be used for differential diagnosis.

The presence of tubercle bacilli in the circulating blood.—The elimination of tubercle bacilli in the milk of tuberculous women, T. KOBASHIKO & MATSUYAMA, and G. YAMADA (*Mitschr. Tuberkulose*, 18 (1912), No. 5, pp. 435-445).—The elimination of tubercle bacilli in the milk of 20 tuberculous women, and in 2 cases which apparently were nontuberculous, was noted. The ch

source of the bacilli was the circulating blood. See also a previous note (R. S. R., 26, p. 281).

The specific antibodies in the blood serum of tuberculous subjects, B. MÜLLER (Deut. Med. Wochenschr., 38 (1912), No. 16, pp. 745, 746).—The author maintains that for the early diagnosis of tuberculosis the serological tests thus far proposed can not be used in actual practice, and accordingly can not supplant the Koch subcutaneous reaction or the von Pirquet test.

Complement fixing bodies can be artificially produced in animals sensitive to tuberculosis just as they are produced in man by injecting large doses of tuberculin preparations. The best method of doing this, however, consists of injecting killed intact whole bacteria. The appearance of complement fixing bodies in the blood serum is an indication that a change is taking place in the humoral tissues, but whether this change has any significance as far as curing the disease is concerned must, according to the author, remain an open question. A positive prognostic significance can not be attributed to the complement fixing antibodies.

Examination of the feces of tubercular and nontubercular cattle, S. H. GILLIAND (Ann. Rpt. Penn. Dept. Agr., 16 (1910), pp. 157-165).—These experiments included tuberculin-reacting cattle with physical symptoms of tuberculosis, tuberculin-reacting cattle showing no physical symptoms of tuberculosis, and immunized cattle free of tuberculosis.

It was shown as a result of these tests that the microscopic examination of feces or rectal scrapings of cattle is of no value for detecting tubercle bacilli, because many bacteria are present in the feces which have the appearance and staining properties of the tubercle bacillus but which in the end do not prove themselves to be such. The animal inoculation test when applied in this direction is a valuable but not an infallible test. "Of the 40 cattle included in the examination, 9 (22.5 per cent) were found to be throwing off virulent tubercle bacilli in the feces or rectal scrapings. Of these 9 cattle, the tubercle bacilli were found virulent for guinea pigs, and in 8 of 9, the tubercle bacilli were virulent for rabbits."

Where the bacteria detected in the rectal scrapings, etc., have been proved to be tubercle bacilli, proof is presented that either an open tuberculosis exists or tubercle bacilli are passed through the length of the alimentary tract. "The demonstration of tubercle bacilli in the feces or rectal scrapings of cattle apparently free of tuberculosis, but stabled with highly infected cattle, may be accepted as an indication that tubercle bacilli are passing through such cattle, the tubercle bacilli being ingested and thrown off in numbers large enough to be demonstrable in the feces or rectal scrapings. . . . Tuberculin-reacting cattle do not necessarily throw off tubercle bacilli in the feces until the development of 'open' lesions of tuberculosis, in which event the condition may be detected by a consideration of the history, careful observation, and a complete physical examination."

See also a previous note (R. S. R., 27, p. 382).

Results obtained with the conjunctival reaction with tuberculin, as well as the local tuberculin reaction with bovines, A. WOLFF-KUNNE (Ztschr. Tiermed., 15 (1911), No. 1, pp. 1-49; abs. in Ztschr. Tuberkulose, 18 (1912), No. 5, pp. 493, 495).—After a study of the reaction with a large number of bovines the conclusion is reached that it is more satisfactory than the subcutaneous test. An exact statement of the procedure as followed by the author is given. A 40 to 50 per cent solution of tuberculin (bovotuberculin) and a dried tuberculin was employed. Two or 3 instillations are given for the purpose of controlling the reaction.



Combating bovine tuberculosis according to the new epizootic laws in Germany, E. SCHARF (*Berlin. Tierärztl. Wchnschr.*, 28 (1912), No. 26, pp. 349-353).—A discussion of the methods for diagnosing tuberculosis in bovines in Germany. Various phases of the law are critically discussed, including the reimbursing of the owner of tuberculous cattle.

Experience in eradicating tuberculosis from a herd, N. S. MAYO (*Expt. U. S. Live Stock Sanit. Assoc.*, 15 (1911), pp. 186-191).—This is a brief history of an outbreak of tuberculosis in the herd of the Virginia Polytechnic Institute, together with advice in regard to eradicating tuberculosis from herds.

Cultivation of the bacillus of chronic intestinal inflammation of the bovine (paratubercle bacillus), H. HOLTH (*Ztschr. Infektionskrankh. u. Hyg. Haustiere*, 11 (1912), No. 5, pp. 378-387, figs. 6; *abs. in Jour. Comp. Path. and Ther.*, 25 (1912), No. 2, pp. 148-150).—In the author's investigation of John's disease cultures obtained from a case which reacted to avian tuberculi were planted upon 7 types of media. The most abundant growth was obtained on media consisting of blood serum with  $\frac{1}{4}$  volume of liver broth, 2 per cent dead tubercle bacilli, and 4 per cent glycerin.

"At 6 weeks the whole surface of the medium was covered with colonies that were visible to the naked eye, and which later attained a size varying from  $\frac{1}{4}$  to 1 mm. By reflected light the colonies were greyish-white in color, and by transmitted light yellowish-brown. They were circular in outline, and under a low magnification the surface was observed to present a slightly wrinkled appearance. The colonies were tough. In older cultures there was observed the formation of a thin delicate membrane of wrinkled growth extending round the colonies. Growth on the other media presented similar appearances, but developed more slowly. Subcultures on the same medium yielded quite abundant growth in about 4 weeks."

The inoculation of guinea pigs failed to induce the disease, producing at most a small encapsuled abscess at the seat of inoculation, the contents of which contained a few granular acid-fast bacilli. Experiments with rabbits gave similar results. In experiments with tuberculin-tested calves, inoculations made subcutaneously and intravenously caused no reaction. Three months later the calves were tested with ordinary tuberculin and did not react but with avian tuberculin typical reactions were obtained at the end of 3 weeks.

"Experiments were carried out with guinea pigs with the object of ascertaining whether John's bacillus is capable of conferring any immunity against tuberculosis. The animals received 2 comparatively large doses of culture, and a month later a dose of bacilli of the bovine type. Control animals were inoculated with the bovine bacilli alone. All the animals were weighed twice weekly, and it was found that the control animals commenced to lose weight sooner than the others. The author concludes that a slight degree of immunity was established."

The anaplasmoses of cattle, L. H. W. BEVAN (*Vet. Jour.*, 68 (1912), No. 445 pp. 392-400).—This is a general discussion of the subject. It is pointed out that while trypanline is invaluable in checking piroplasmosis it is ineffective against anaplasmosis, which in the present state of our knowledge can be combated only by careful nursing and a diet which can be digested, assimilated, and made use of to replace and repair the loss of tissue caused by the disease.

Anaplasmosis of sheep, L. H. W. BEVAN (*Vet. Jour.*, 68 (1912), No. 445, pp. 400, 401).—The author reports the occurrence of this disease among sheep. He states that it has a wide distribution throughout Rhodesia.

In regard to a vaccine prepared by a new method against hog cholera and swine plague, KRAFFT (*Berlin. Tierärztl. Wchnschr.*, 28 (1912), No. 15, pp. 261-266).—The preparation of the vaccine is based on the following principle:

To warmed mixtures of highly virulent organisms certain metals are added for reducing the virulency of the micro-organisms, since micro-organisms so attenuated, when injected into animals, can be borne with impunity. Metallic salts in solution can not be used for this purpose on account of their toxicity. The vaccines prepared according to the above principle are employed by the author for immunizing purposes. The results of tests conducted with the vaccines prepared in this manner on mice, guinea pigs, rabbits, and shoats are reported, and showed good immunizing properties.

The vaccine for swine plague was prepared from *Bacillus suispestifer*, while that against hog cholera was produced with *B. suispestifer*. Some tests were also conducted, although very vaguely reported, with a vaccine prepared from *B. suispestifer* and the filtered blood from cases of hog cholera (also organ filtrates) which were exposed to the action of metals. The results of tests in veterinary practice showed that the latter preparation gave better results than those obtained with the *B. suispestifer* vaccine alone.

The diphtheria of suckling pigs, E. WYSSMANN (*Schweiz. Arch. Tierheilk.*, 32 (1910), No. 2, pp. 89-120; abs. in *Berlin. Tierärztl. Wchnschr.*, 27 (1911), No. 33, pp. 696, 697).—After describing the symptoms of this condition and the Gullibean diphtheria bacillus which is usually present in the nasal and similar mucous membranes, the author states that this condition is either a special form of hog cholera where the diphtheria bacillus plays a secondary part, or a diphtheria proper.

#### RURAL ENGINEERING.

Private irrigation enterprise compared with government reclamation, F. G. TRACY (*Denver, 1912*), pp. 31).—The author presents the opinion that the real meaning of the Reclamation Act has been misconstrued, and he attempts to show by tables of census data that private irrigation projects under the Carey Act have accomplished considerably more for less money than the Reclamation projects in the various States.

Irrigation and irrigating canals (*Rpt., Cal. Bd. Agr., 1911*, pp. 205-223).—This report briefly reviews the history of irrigation in California, discusses the reclamation works, dry farming, and private irrigation districts and systems, and describes the rivers, creeks, and lakes of the State, giving data of stream flow, drainage, and run-off in the different basins and drainage areas. Tabulated comparisons of irrigated farms and lands in different localities are also included.

Electric irrigation pumping in southern California (*Elect. World*, 59 (1912), No. 23, pp. 1255-1259, figs. 8).—A description is given of the use of electric pumps in the Pomona district.

About 125 electrically driven irrigation pumping plants are operating within a radius of 10 miles, practically all the energy being supplied by a substation in the city of Pomona, connected with the general transmission of a power company by two 3-phase, 83,000 volt lines, the potential being reduced from 33,000 to 10,000 volts for local distribution among the ranches. The plants are designed for both deep-well and low-lift service, depending on local conditions, using 4 to 5 in. centrifugal pumps for the shorter lifts and double-acting cylinder pumps for the deep-well service. The cost varies from 2 to 3 cts. per kilowatt hour.

[Drainage problems in West Tennessee], L. L. HINDNER and A. E. MORGAN (*Resources Tenn.*, 2 (1912), No. 6, pp. 231-249, pls. 2, figs. 2).—A report on the drainage problems of the Wolf, Hatchie, and the South Fork of the Forked Deer rivers in West Tennessee, which drain approximately 4,815 square miles,

including plans of improvements, maps of surveys, descriptions of stream basins and adjacent drained territory, discussions of methods of reclamation by surface drainage with levees and by ditches, and plans for conveying ditch water under stream beds, levees, and main drainage channels by means of inverted siphons and concrete culverts.

The information indicates that channels should be large enough to carry a run-off of 1 in. in depth from the entire area drained by the river for large areas and somewhat larger for small areas where an excavated channel is economical. Where the volume of water is so great as to make undersurface channels too expensive, levees should be constructed sufficient to provide for a run-off of from 1½ to 2 in. per 24 hours from the entire watershed. The cost of the works approximates from \$25 to \$30 per acre.

[A tile drainage project] (*Brick and Clay Rec.*, 40 (1912), No. 11, pp. 473-482, figs. 11).—A discussion of the planning and construction of a tile drainage system, reclaiming 500 acres of land on the Desplaines River in Illinois, in which work 250 carloads of tile and 2 years' time were consumed, and 6½ miles of tile drains constructed. The cost of draining was approximately \$75 per acre.

Practical road building, J. N. EBY (*Municipal Engin.*, 42 (1912), Nos. 4, pp. 215, 216; 5, pp. 351-354, fig. 1; 6, pp. 436-439, fig. 1).—Brief specifications are given for the construction of sand-clay roads on a sand or clay subsurface and for the construction of gravel and macadam roads. Directions for the maintenance of these roads are also presented.

Road building with convict labor, D. GLASS (*Country Gent.*, 77 (1912), No. 16, pp. 3, 39, fig. 1).—The successful and economical use of convict labor for road building in Georgia is noted, the cost being found to be much cheaper than that of other labor. Chert roads have been built at a cost of from \$4,000 to \$5,000 per mile, while a sand and clay road costs from \$400 to \$500 per mile.

First report of the proceedings of the road board for the period from May 13, 1910 to June 30, 1911 (*Rpt. Proc. Road Bd. (Gr. Brit.)*, 1 (1910-11), pp. 69).—A report on the existing physical and financial conditions of roads in the United Kingdom.

A new English tar tester (*Good Roads*, n. ser., 3 (1912), No. 22, p. 337, fig. 1).—A device is described which is intended to furnish a quick and easy method of testing bituminous materials to be used in road repair and construction. The instrument consists of a 9-in. stem carrying a weight bulb, and 2 rings marking the beginning and end of the test. The test is based on the speed with which the instrument sinks in the liquid under examination.

Concrete costs, F. W. TAYLOR and S. E. THOMPSON (*New York and London*, 1912, pp. XXII+709, pl. 1, figs. 76).—This book gives tables and recommendations for estimating the time and cost of labor operations in concrete construction and for introducing economical methods of management.

Farm blacksmithing, G. BAXTER (*Jour. Dept. Agr. Victoria*, 9 (1911), Vol. 7, pp. 479-482; 8, pp. 545-549; 9, pp. 610-615; 10, pp. 685-689; 11, pp. 739-743; 12, pp. 795-799; 10 (1912), Nos. 1, pp. 49-54; 2, pp. 123-127; 3, pp. 192-195; 4, pp. 217-221, figs. 59).—It is the object of this article to instruct the farmer how to lay out a blacksmith shop and make simple and useful articles connected with farm work and farm machinery. The required tools are enumerated and the processes of forging, welding, etc., are discussed in detail.

[Experience with farm powers], R. E. GUNN (*Farm and Dairy [Ontario]*, 31 (1912), No. 23, pp. 609, 617, fig. 1).—The author relates his experience with the use of gasoline, steam, wind, and electric power on his farm, and states that electric power has supplanted all others.

How horsepower is to be computed (*Farm Machinery*, 1912, No. 1077, pp. 45, 77).—A general discussion of the methods of computing the power and efficiency of machinery with special reference to agricultural tractors, explaining the actual difference between indicated and brake horsepower, and stating as the factors to be considered in a comparison of the tractive horsepower of engines, the mean effective pressure, piston area and speed, dead weight of engine, and ground surface.

What electricity will do for the farmer (*Conn. Farmer*, 42 (1912), No. 21, p. 3).—Results of tests made on farms by a corps of engineers from an electrical appliance company are given, showing the different amounts of work done in a given time by different farm machines driven by electricity and the cost of the operation in each case.

An experience with electric motors, D. R. PALMQUIST (*Country Gent.*, 77 (1912), No. 23, p. 5, figs. 2).—Some actual cost figures for the work done by a 15-horsepower portable motor on an average farm are given and compared with the costs of doing the work by other methods. The motor cost \$200 and the power was supplied at 8 cts. per kilowatt hour. Some of the comparisons are as follows: 1,700 bu. of grain were threshed for \$8.60, the cost of doing this by steam or gas tractor being \$9; 4,000 bu. of corn were ground for \$180, the cost at the nearest mill being \$308; and fodder shredding cost \$2.74 per ton, a neighborhood custom machine charging \$3 per ton.

Electric farm lighting plant installation, G. D. HARRIS (*Gas Engine*, 14 (1912), No. 6, pp. 532-535, figs. 2).—A brief discussion of the practicability of small lighting plants, their successful operation, and the size, equipment, and cost of a plant most applicable to the average farm.

[Tests of implements], G. FISCHER ET AL. (*Arch. Deut. Landw. Gesell.*, 1911, No. 193, pp. 80, figs. 63).—Descriptions and the methods and results of competitive tests are given of subsoil plows and pond-weeding machinery, with the results of preliminary examinations of several improved agricultural implements, among which are improved manure spreaders, rollers, straw presses, potato diggers, turnip headers, cultivators, mowers, and stump pullers, and the results of individual tests of subsoil packers, motor threshers, manure spreaders, and road tractors.

A new driving wheel for power plowing outfits, A. M. LTONI (*Gas Engine*, 14 (1912), No. 6, pp. 316-318, figs. 3).—A driving wheel is described which is equipped with a number of spades, and operated by an eccentric in such a way that with the rotation of the wheel they are pushed into the soil vertically, one after another, providing fixed points of power application for the forward movement of the vehicle and causing a minimum loss of energy.

Automobile mowing machines and motor-driven mowers, M. RINGELMANN (*Jour. Agr. Prat.*, n. ser., 23 (1912), No. 19, pp. 592-594).—These 2 types of machines and their operation are described. It is claimed that with the automobile mower about 4,000 square meters (about 1 acre) of hay or other forage can be mowed in an hour. The motor-driven mowing machine requires 1 man and only 1 horse to do the work of an ordinary 2-horse machine.

Trials with small self-cleaning threshing machines, 1911, C. V. BIRK and C. L. FILLBERG (*Tidsskr. Landökonomi*, 1912, No. 3, pp. 181-224, figs. 11).—Eighteen different machines were examined and tested by the committee on machinery trials of the Royal Danish Agricultural Society. The report gives the results of the trials and the judgment of the committee as to the strong and weak points of the different machines.

Spraying apparatus, H. A. SURFACE (*Bi-Mo. Zool. Bul. Penn. Dept. Agr.*, 2 (1912), No. 2, pp. 63-77, pls. 5).—A general discussion is given of apparatus for spraying orchards and field crops, including descriptions of various types

of hand and power sprayers. Considerable information is presented relative to the selection of spraying apparatus to satisfy special conditions.

[An automatic watering device] (*Deut. Landw. Presse*, 39 (1912), No. 30, p. 468, figs. 2).—A device for watering stock is described which is operated by the weight of the animal pressing down the approach board. This action is transmitted to a pump, thereby supplying fresh water for each animal.

Preliminary tests of new milking apparatus, B. MARTINY (*Arch. Deut. Landw. Gesell.*, 1912, No. 211, pp. 107, figs. 11).—A report of the methods and results of tests of 3 milking machines, giving a description of each machine and a general discussion of test results.

[A cream separator] (*Indus. Latt. e Zootec.*, 10 (1912), No. 10, pp. 153, figs. 3).—A description is given of a separator which can be operated by hand or motor, with the results of 10 tests.

[Report of competitive tests of refrigerating and cold storage apparatus], B. MARTINY (*Arch. Deut. Landw. Gesell.*, 1912, No. 210, pp. 24, pls. 3, figs. 10).—Descriptions are given of the construction and operation of refrigerating and cold storage apparatus designed more especially for dairy use, with the methods and results of competitive efficiency tests. The machines included self-acting refrigerators, hand and motor-driven coolers, and refrigerating and cold storage apparatus operating on a large scale. Some of the test results are graphically presented.

A small dairy house (*Farmers' Rev.*, 44 (1912), No. 26, pp. 537, 541, fig. 1).—The essential factors to be considered in dairy house construction are pointed out, especially the need of drainage, cleanliness, ventilation, and sunlight, and the construction and equipment of a small dairy house recommended by this Department are described.

The silo for Missouri farmers, C. H. ECKLES (*Missouri Sta. Bul.*, 163, pp. 293-305, figs. 4).—This is a bulletin of information for the Missouri silo user or prospective builder. Tables stating the tonnage capacity of silos of various sizes, and the proper capacity to build for herds of given sizes are followed by descriptions of different silo types; suggestions on crops for the silo; directions for cutting, filling, and feeding; and a brief list of bulletins on silos and silage.

## RURAL ECONOMICS.

The organization of country life, W. M. HAYS (*Farmers' Nat. Cong. U. S. Proc.*, 31 (1911), pp. 139-146).—An address delivered at the Farmers' National Congress, Columbus, Ohio, October 12, 1911, in which the author discusses at length some phases of eugenics as applied to agriculture and the rural population of this country. He suggests the organization of country life interests into a great delegate body, representing all the departments, institutions, and associations of national and state scope which are devoted to the upbuilding of country life, and this organization in turn to be federated with the Federation of Women's Clubs, the Federation of Labor, the National Manufacturers' Association, the Association of Railways, and other large organizations. Such a general federation he thinks could work out in a large way many things which would make for the prosperity and happiness of the whole people.

What is farm management? How does it help the practical man to solve his problems? W. J. SPILLMAN (*Tribune Farmer* [N. Y.], 11 (1912), No. 531, pp. 3, 17, fig. 1).—This article presents a discussion of what constitutes farm management, and the scope of its application. The author refers to it as "an old practice, but a new science—choosing the best type, organizing, and equipping the farm to the best advantage, and operation to secure the best utilization and distribution of equipment and labor are prime essentials."

**Agricultural credit and its reorganization, KUNZE (Der Landwirtschaftliche Kredit und seine durchgreifende Verbesserung. Berlin, 1911, pp. VII+84).**—The results of an economic study of agricultural credit and its reorganization in Germany are presented and discussed. It is pointed out that the increase in running expenses in agriculture has exceeded the increase in the amount of money available for loans on land, thereby making more necessary the freeing of agriculture from debt. The privileges of mortgage holding are discussed and the necessity of their removal to the advantage of agricultural personal credit is explained.

**Adaptation of the European credit system to meet the needs of the American farmer, D. LURIN (U. S. Senate, 62. Cong., 2. Sess., Doc. 855, 1912, pp. 14).**—This document presents a report made to the International Institute of Agriculture on the conference held at Nashville, Tenn., April 1-6, 1912, looking to the appointing of a select committee from the various States in the Union to go to Europe and investigate rural cooperative credit systems in operation there with a view to adapting them to the needs of American agriculture.

A number of suggestions are offered as a solution of the rural finance problem in the United States, among them the establishment of a system of agricultural national banks.

"One plan would be for the incorporation or cooperative association of groups of farmers, when they could devise and offer as security for the money they require a negotiable bond on their collective assets, a bond at a valuation and of a character which should make it acceptable in the world of commerce and in so liquid a form as to require no lawsuit for foreclosure. This bond could then be offered in the open market, and the funds for the cooperative banking be thus obtained. These funds could then be employed, first, for the use of the individual members of the cooperation, and, second, for the collective use of the cooperation as a whole in swinging its product to market; in its distribution."

A modification of this plan might be had by the formation of rural national banks, on the order of the existing national banks. "Let the cooperative groups of farmers call on government bond owners to transfer their bonds to these farmers' groups. Let the farmers pay the bond owners, say 1 per cent per annum for the privilege of this transfer. Let them deposit these transferred government bonds, along with their own negotiable land bonds, in the United States Treasury, where they would be held in trust for both parties by the United States. On the security of these government bonds the United States could issue national rural bank notes to these cooperative groups of farmers, just as it does in the case of national banks. The United States bond owner would then receive interest on his coupons, plus the 1 per cent per annum extra from the farmers' cooperative groups. These groups would thus have money at 1 per cent per annum, and the government bond owner would have as security a negotiable bond on the collective property of the farmers' cooperation, security which would exceed in value the United States bond deposited in the Treasury. In substance, the negotiable bond for this property and the government bonds would both be held in trust by the United States Government, which would simply act as umpire between the bond owners and the farmers, and thus this transaction would be free from any phase of so-called socialism."

**A cooperative sugar factory in Holland, J. W. ROBERTSON-SCOTT (Jour. Bd. Agr. (London), 18 (1912), No. 12, pp. 1014-1017, pl. 1).**—This article notes what is being done in the way of cooperative manufacture of sugar by farmers in Holland. One of the first factories established was in 1909 with 3,000 shares and

300 members, each paying £8 4s. per share. The figures in the following table show results of its working since beginning operation:

Work of cooperative sugar factory at Dinteloord, 1909-1912.

Years.	Number of members.	Number of shares.	Beets handled per season.	Beets handled daily.	Price paid per unit.
1909-10.....	644	3,150	Tons, 65,000	Tons, 1,668	21s. 6d.
1910-11.....	704	3,308	67,000	1,673	25s. 1d.
1911-12.....	729	3,530	119,000	1,490	28s. 4d.

"From the farmers' point of view, the cooperative factory is no doubt the ideal way of going to work." In this way the farmer gets his profits as beet grower and his dividend as a sugar manufacturer, it being stated that for the season 1911-12, "the members will be paid about 8s. 4d. more per ton for their beets than they would have got . . . from the joint stock companies."

[Compulsory insurance against sickness and unemployment] (*Internat. Inst. Agr. [Rome], Bul. Bur. Econ. and Soc. Intel.*, 3 (1912), No. 5, pp. 285-119).—This article presents a discussion of the national insurance act of Great Britain and Ireland, which provides for the compulsory insurance of practically all persons employed in the United Kingdom under any contract of service or apprenticeship. The fund from which the insured are paid is raised by contributions from the State, employers, and the insured persons. The compensation for men is 7d. per week, for women 6d. "Where the rate of remuneration exceeds 1s. 5d. but does not exceed 2s. a working day, the State will pay 1d. per week, the employed contributor 1d. per week, and the employer 5d. for men and 4d. for women." Other data pertaining to the provisions and enforcement of the act are given, also a lengthy bibliography.

Influence of the agricultural associations and corporations on the organization of the German labor market (*Internat. Inst. Agr. [Rome], Bul. Bur. Econ. and Soc. Intel.*, 3 (1912), No. 5, pp. 56-57).—The progress in industrial centers, depopulation of rural districts, new methods applied in farming, and unwillingness of agricultural laborers to contract for long periods have greatly increased the demand of German farmers for foreign labor, especially for the sowing and harvesting periods. Private labor bureaus being inadequate to supply this demand, several unions and corporations have endeavored to centralize the organization of the agricultural labor market, under the Central German Agricultural Labor Bureau.

The government has recognized this bureau and bestowed upon it certain special powers with regard to the registration of foreign laborers, and in reorganizing the agricultural labor market. In 1909, the bureau procured 70,397 foreign laborers, 76,001 in 1910, and 78,296 in 1911. It legitimized, that is, authorized to remain in the German Empire, 374,751 agricultural laborers in 1910, and 387,902 in 1911. "It has begun to exert a very useful action as arbitrator between foreign laborers and German masters for the benefit and to the advantage of both parties." In 1909, 280 workmen and 212 masters appeared to it to settle their differences; in 1910 there were, respectively, 523 and 220 cases, and only 47 could not be amicably adjusted.

Other data as to the work of the bureau are given.

Increasing the efficiency of farm labor, W. M. KELLY (*Nick. Farmer*, 138 (1912), No. 22, p. 613, fig. 1).—Observations are made showing that in order to secure the greatest possible efficiency of farm labor the work must be

planned in such a way as to keep the laborers busy every day. Some suggestions are made regarding selection of crops and crop rotations and the selection of live stock and farm machinery with this end in view.

**Agricultural population and its growth.** A. C. LEXOCO (*Rev. Agron. [Portugal]*, 9 (1911), No. 1-6, pp. 14-44).—Notes and tables are given showing the movement of the agricultural population for a number of years in Portugal. It is noted that the rural population was 71.5 per cent of the total population in 1864, and 67.1 per cent in 1900. In 1890 the agricultural population was 3,088,610, and in 1900, 3,367,190, an increase of 9 per cent; while the non-agricultural population was 1,961,119 in 1890, and 2,065,933 in 1900, an increase of 4.8 per cent.

**Abstract of statistics of the number and distribution of inhabitants** (*Bur. of the Census [U. S.] Bul. 13*, pp. 55, figs. 6).—This bulletin presents in condensed form the principal results of the population census of 1910, including among other data tables and maps showing by divisions and States the urban and rural population in 1910, 1900, and 1890, and the increase in population during the same period.

**[Agricultural and pastoral statistics for 1910 in Queensland]**, T. WEDDON (*Ann. Rpt. Dept. Agr. and Stock [Queensland]*, 1910-11, pp. 115-172).—Despite favorable climatic conditions for a number of years, only a small increase of cattle and sheep in Queensland is reported, this being attributed largely to the greater demand for dressed meat and meat products. Owing to governmental supervision of dairy products much recent progress is noted in dairying, the number of dairy cattle having increased from 304,281 in 1903 to 305,444 in 1910, and the quantity of butter from 17,538,473 lbs. in 1904 to 31,258,333 lbs. in 1910.

A continuous decrease in the excess of exports over imports of agricultural products from 1906 to 1910 is noted. Tables showing acreage, yield, total production, value, etc., of all crops are given. The estimated value of crops for 1910 was \$3,833,707, an increase of \$378,291, the principal items being sugar cane, \$1,262,213; corn, \$980,046; green forage, \$448,335; fruits, \$363,018; alfalfa hay, \$322,339; wheat, \$204,475; and potatoes, \$132,872. A tendency is noted on the part of farmers to bring an increasing area of their holdings under cultivation, the average size of cultivated farms being 36 acres in 1906 and 40 acres in 1910.

**Rural economy in the Bombay Dekkan**, G. F. KEATINGE (*Agr. Jour. India*, 6 (1911), Nos. 3, pp. 268-280; 4, pp. 344-352).—This article discusses the general conditions under which live stock is bred and reared in Dekkan, showing that in 1910 the number of horses and ponies totaled 71,000; sheep, 1,300,000; goats, 1,300,000; buffaloes, 500,000; and cattle, 2,900,000. Of the total number of cattle, 1,315,000 are used as plow cattle, cultivating about 13,635,000 acres, horses being of little importance. The supply of work cattle is said to be 31 per cent short of the demand, due possibly to the lack of attention given toward increasing the number or improving the quality. In many localities the cows and young stock are not fed but turned out all the year to feed upon the public grazing lands, and as these are practically barren wastes from March to July, the losses are very large.

The economic significance of farm machinery in connection with the land, the farmer, and the resources of the country is discussed, also the importance of circulating and reserve capital (*E. S. R.*, 25, p. 595).

**Crop Reporter** (*U. S. Dept. Agr., Bur. Statis. Crop Reporter*, 14 (1912), No. 1, pp. 41-48, fig. 1).—Notes and statistics showing cotton condition May 25, and other crop conditions June 1, 1912, with comparisons; farm value of important products on dates indicated; foreign crop conditions; monthly receipts and stocks of eggs and poultry in the United States; range of prices of agri-



cultural products at important markets; temperature and precipitation statistics; the production of fruit and nuts in continental United States; and the causes and extent of crop damage in 1912 by States are here presented.

History of the Minnesota State Agricultural Society from its organization in 1854 to the annual meeting of 1910, D. S. HALL and R. I. HOLCOMB (*St. Paul, Minn., 1910, pp. 405+XXIII, figs. 140*).

### AGRICULTURAL EDUCATION.

The interrelationship of agricultural colleges and experiment stations, R. YOUNGLOO (*College Station, Tex., 1912, pp. 15*).—This paper, presented at the Conference for the Advancement of Agriculture of the Agricultural and Mechanical College at College Station, Tex., on April 20, 1912, comments briefly "upon the history and development of the agricultural colleges of this country with a view to understanding the scope and functions of their various divisions as a working basis upon which to develop satisfactory relationships within these institutions.

Agricultural education in secondary schools (*U. S. Bur. Ed. Bul., 1912, No. 6, pp. 53*).—This bulletin is made up of the following papers read and discussed at the annual meeting of the American Association for the Advancement of Agricultural Teaching, Columbus, Ohio, November 14, 1911: Essentials in a State System of Agricultural Education, by F. W. Howe; The Need for Reliable Scientific Data Regarding Social and Economic Conditions in the Rural Communities, by E. C. Higley; The Proper Equipment of an Agricultural High School, by D. O. Barto and D. J. Crosby; The Smith's Agricultural School and Agricultural Education in Massachusetts, by R. W. Stimson; The Unprepared Teacher of Agriculture in High Schools and Colleges, by A. V. Storm; and What is Being Done to Prepare Teachers of Secondary School Agriculture, by A. C. Monahan. A list of other recent publications of the Bureau of Education on agricultural education is also given.

The proper equipment of an agricultural high school, D. O. BARTO and D. J. CROSBY (*U. S. Bur. Ed. Bul., 1912, No. 6, pp. 29-27*).—For the proper study of soils suitable provisions for collecting, drying, and determining their essential constituents are necessary. A laboratory should be well stocked with carefully selected, prepared, and labelled specimens of farm crops, weeds, weeds, etc. Samples of various commercial fertilizers on the market should be kept labelled to show their chemical composition. There should be a glass house properly heated, where plants may be grown and studied during the winter. Too much land should be avoided as small plots worked with care and accuracy are deemed of much more educational value than larger areas where part of the work is done by some one not connected with the school. Arrangements should be provided for pruning, budding, grafting, spraying, etc. A milk tester, separator, and churn should be provided for instruction in dairying, and the classes should visit the farms of the vicinity to study typical animals, birds, focks, and up-to-date equipment.

The unprepared teacher of agriculture in high schools and colleges of education, A. V. STORM (*U. S. Bur. Ed. Bul., 1912, No. 6, pp. 33-40*).—The author believes that the standard of preparation for a teacher of agriculture should contain the same elements whether he is to teach agriculture in a country school, high school, normal school, or college, and would differ only in the proportionate amount of each and the special adaptation to the particular kind of school. The proper preparation for one who is to teach agriculture in a high school would be, besides moral and natural fitness, a general education consisting of actual experience on the farm, elementary training in reading, soil-

language, spelling, geography, etc., and a strong high school course of 4 years distributed about as follows: Mathematics, 2½ years; English, 3 years; history and civics, 2 years; science, 3½ years; foreign language, 2 years; and electives, 3 years. If the pupil is preparing to teach in the elementary schools his advanced work could be taken at a normal school, but if in schools above those of elementary grade his advanced training should be received at a college or university. His advanced preparation should be in 4 different lines: (1) General, which includes such subjects as English, public speaking, and economics; (2) technical, constituting botany, chemistry, zoology, physiography, physics, and agriculture as a specialty; (3) professional, comprising such subjects as psychology, history of education, principles of education, principles of general method and the method of the recitation, special methods of high school subjects, and school management; and (4) practice in teaching.

It is suggested that normal schools and agricultural colleges when recommending teachers for agricultural high schools should select their candidates in the following order: (1) Those with natural ability, farm experience, and agricultural preparation, even though they have had no professional preparation or teaching experience; (2) those with natural ability, agricultural preparation, professional preparation, and teaching experience; (3) those with natural ability, farm experience, good science preparation, and teaching experience; and (4) those with natural ability, farm experience, good science preparation, and no teaching experience.

High school agriculture subjects accepted for matriculation at the University of California (*Cal. Agr. Univ. Cal. Spec. Cir.*, 1912, *May*, pp. 4).—This is a full outline of courses in general agriculture, animal husbandry, dairying, horticulture, farm mechanics, and farm management which may be offered by high schools in the State for entrance credits at the college of agriculture of the University of California for a total of 9 units.

University Farm School, Davis, Cal. (*California Sta. Cir.* 77, pp. 23, figs. 13).—This circular contains an announcement of the 3-year course of study at the institution, and briefly describes the work of the school.

Seed testing, W. L. OSWALD (*Univ. Minn., Dept. Agr., Ext. Bul.* 24, 1911, pp. 8, figs. 12).—Directions are given for home purity and germination seed tests.

Oklahoma school hotbeds, S. A. MINEAR (*Bul. Okla. Agr. and Mech. Col.*, 8, (1911), No. 14, pp. 7, figs. 5).—This bulletin is intended to assist Oklahoma teachers in the construction and use of hotbeds in their schools.

Transplanting, V. H. DAVIS (*Agr. Col. Ext. Bul. [Ohio State Univ.]*, 7 (1912), No. 8, pp. 16, figs. 14).—The author discusses transplanting operations, particularly the replacing of the lifted plant in the soil by the ultimate purchaser. Trees, shrubs, and herbaceous plants are considered separately. A homemade corn tester is described and illustrated.

A method of illustrating the trees, J. E. KIRKWOOD (*Nature-Study Rev.*, 8 (1912), No. 1, pp. 39-41, fig. 1).—The author describes a set of botanical preparations, originally designed for the exhibit of the University of Montana at the state fair but since found of much practical value in school work. Each preparation illustrates one species and consists of a wall frame 26½ by 32½ in., containing a card on which is mounted under glass a full-sized herbarium specimen of the species, showing leaves and flowers, the fruit where practicable, a seedling, a map showing distribution, a section of the wood, several photographs of individual trees showing the character of the bark or other features, and landscape scenes depicting the habitat of the species. Some of this material may be contributed by the pupils as a part of their laboratory or field work.

A guide for the study of animals, W. WHITNEY ET AL. (Boston, New York, and Chicago, 1911, pp. IX+197).—This guide is intended for pupils in secondary schools, and gives particular attention to the chordates. Special prominence is given to the economic side of zoology, especially its bearing on medicine, sanitation, household science, and agriculture.

Oregon boys and girls and the egg problem, J. DAYBURN (Oreg. Agr. Col. Bul., Ext. Ser. 2, 1912, No. 2, pp. 4).—This bulletin gives instructions for boys and girls on feeding and housing fowls, with an estimate of the profits.

Ravenel's road primer for children, S. W. RAVENEL (Chicago, 1912, pp. 153, pls. 21, figs. 34).—This primer was compiled and prepared at the request of the National Congress of Mothers. It gives instruction and suggestions concerning elementary principles and practices of road making, causes and effect of good roads, their location, grades, drainage, maps and profiles, construction, and maintenance, narrow and wide tires, some kinds of roads, and machinery necessary for the use of road builders.

#### MISCELLANEOUS.

Biennial Report of Connecticut Storrs Station, 1910-11 (Connecticut Storrs Sta. Rpt. 1910-11, pp. XL+601, pls. 19, figs. 216).—This contains the organization list, a financial statement for the fiscal years ended June 30, 1910, and June 30, 1911, reports of the director and heads of departments, reprints of Bulletins 59-69, and a general weather review, abstracted on page 414 of this issue.

Nineteenth Annual Report of Minnesota Station, 1911 (Minnesota Sta. Rpt. 1911, pp. XIIIV+188+XI, pl. 1, figs. 38).—This contains the organization list, a list of the publications of the year, a financial statement for the fiscal year ended June 30, 1911, a report of the director summarizing the work of the station and its substations, and reprints of Bulletins 121-124, previously noted.

Twenty-second Annual Report of New Mexico Station, 1911 (New Mexico Sta. Rpt. 1911, pp. 57, figs. 4).—This contains the organization list, a report of the director briefly summarizing the work of the station since its establishment, lists of the changes in staff, publications, and exchanges of the year, departmental reports on the various lines of station activities during the year, and a financial statement for the fiscal year ended June 30, 1911. The report of the meteorologist and a portion of that of the horticulturist are abstracted elsewhere in this issue.

Finances, meteorology, index (Maine Sta. Bul. 197, pp. 329-344+XII).—This contains the organization list of the station; meteorological observations noted on page 414 of this issue; a financial statement for the fiscal year ended June 30, 1911; an index to Bulletins 187-197, which collectively constitute the twenty-seventh annual report of the station; a list of the publications issued during the year; and announcements and notes on the work, personnel, and equipment of the station.

Report of work at the Delta Branch Experiment Station for 1911, G. B. WALKER (Mississippi Sta. Bul. 157, pp. 23, figs. 5).—This contains a report of the work at this substation during 1911, including in addition to the data on field crops, abstracted on page 429 of this issue, brief notes on the work with cattle, mules, and hogs.

## NOTES.

**Georgia College and Station.**—Recent appointments in the college include Charles A. Whittle as editor-librarian, C. M. Kiger as tutor in horticulture, G. E. Rice as a district corn club agent vice G. M. Gay, and H. B. Carpenter as instructor in animal husbandry.

The station live stock and hay barn was struck by lightning on the evening of September 4, causing a loss of the barn, about 15 tons of hay, and several adjoining structures. The loss was covered in part by insurance.

**Massachusetts College and Station.**—Recent appointments in the college include the following: W. D. Clark, of the Pennsylvania College and Station, as professor of forestry; O. A. Morton as extension professor of agricultural education; A. A. Brown as instructor in poultry husbandry; W. W. Chenoweth as instructor in pomology; Samuel Coons as instructor in dairying; E. M. McDonald as instructor in agronomy; Arthur T. Dailey as supervisor of extension courses; and E. L. Morgan as community field agent. F. W. Morse has been designated acting director of the station, beginning October 1.

**Nebraska University and Station.**—R. K. Bliss, of the Iowa College, has been appointed professor of animal husbandry and animal husbandman; W. J. Merrill professor of forestry and forester; and G. C. White, of the Missouri University and Station, adjunct professor of dairy husbandry, vice W. L. French, resigned.

**New Hampshire College.**—Dr. Edward T. Fairchild, superintendent of public instruction in Kansas, has been appointed president.

**Cornell University and Station.**—John Craig, professor of horticulture since 1903, died August 12 at Siasconset, Mass. Professor Craig was born at Lakefield, Quebec, in 1864, and educated at McGill College and the Iowa College, graduating from the latter institution in 1887. For about 12 years he served as horticulturist at the Central Experimental Farm at Ottawa, Canada, returning to Iowa in 1899 to become professor of horticulture. In 1900 he was appointed professor of extension teaching in Cornell, relinquishing this position three years later to accept the chair of horticulture.

Professor Craig was the author of a revised edition of *Practical Agriculture* and a contributor to the *Cyclopedia of American Horticulture*, as well as the author of numerous station publications and articles in agricultural journals. He had been editor of the *National Nurseryman* for several years, and at the time of his death was secretary of the American Pomological Society.

He was especially well known in the field of pomology, having a wide acquaintance and being in much demand as a judge at exhibitions. He was also much interested in nut culture, chairman of the nomenclature committee of the American Sweet Pea and American Peony Societies, and a fellow of the Royal Horticultural Society of Great Britain.

**Ohio Station.**—A. F. D. Wussow has been appointed assistant in the department of nutrition; J. S. Houser has been promoted to the position of associate entomologist.

**Porto Rico University.**—The college of agriculture and mechanic arts opened its new building to students September 23. The initial enrollment of the year was 172, of whom 22 are in the agricultural courses.

**Rhode Island Station.**—Director H. J. Wheeler has tendered his resignation to take effect December 1.

**Utah College and Station.**—The extension work has been reorganized with Dr. R. G. Peterson as director and John T. Caine, III, as assistant director in charge of field parties. Robert J. Evans, Ph. D. (Cornell, 1912), has been appointed agronomist in the station in charge of arid farms and will also assist in the extension work. Dr. J. E. Greaves, associate chemist, has taken over Dr. Peterson's work in bacteriology as professor of bacteriology and bacteriologist, and H. E. McNatt has been appointed assistant animal husbandman in the college and station to succeed Professor Caine. G. M. Turpin resigned October 1 as poultryman to accept a similar position in the Iowa College.

**Vermont College.**—A. K. Pelterson has been appointed instructor in botany in the college of agriculture, vice John P. Helyar, whose resignation has been previously noted; and R. T. Burdick, a 1912 graduate of Cornell University, has been appointed instructor in agronomy.

**Washington College and Station.**—H. B. Humphrey has resigned as vice director of the station to accept the position of head of the department of botany in the college. Robert C. Ashby, superintendent of the farmers' institutes, has been appointed professor of animal husbandry in the college and animal husbandman in the station. Dr. Irm D. Cardiff, of Washburn College, has been appointed professor of plant physiology and bacteriology in the college and plant physiologist in the station.

**Recent Federal Agricultural Legislation.**—Aside from the agricultural appropriation act, a summary of which has already been given (E. S. R., 27, p. 301), among the principal agricultural measures to be enacted at the recent session of Congress was the Plant Quarantine Act, approved August 20. Under this law nursery stock may now be imported only after a permit has been issued by the Secretary of Agriculture, when properly labeled, and when accompanied by a certificate of inspection from the country of export (or in case no official system of inspection is maintained in that country upon compliance with regulations prescribed by the Secretary). Notice of its arrival at a port of entry in this country must also be given to the Secretary, and its subsequent movements in interstate commerce or the District of Columbia reported until it has received inspection from the proper state official.

Similar regulations may also be promulgated as regards the importation of other plants, fruits, vegetables, seeds, etc., in case their unrestricted entry be comes prejudicial. Whenever deemed necessary in order to check the introduction of a new pest, importations may be excluded entirely from certain countries or of certain kinds of plants and their products, and any State may be quarantined as regards the shipment of affected products in interstate commerce. A foreign quarantine has already been put in force against the white pine blister rust and potato wart, and a domestic quarantine against *Hemlock* products likely to carry the Mediterranean fruit fly.

The administration of the act is entrusted to a Federal Horticultural Board of this Department, consisting of C. L. Marlatt and A. F. Burgess of the Bureau of Entomology, W. A. Orton and Peter Bisset of the Bureau of Plant Industry, and G. B. Sudworth of the Forest Service. The act as a whole became effective October 1, and carries an appropriation of \$25,000.

Another important measure, passed August 24 and effective February 24, 1913, prohibits the importation for seeding purposes of grain and grass seed

which are deemed adulterated or unfit for seedling purposes because of excessive weed content.

An act approved August 3 establishes a standard apple barrel containing 7,660 cubic inches, and defines standard grades for the fruit on the basis of variety, size, and quality. Labeling the barrels remains optional, but the use of the designation "standard" in case the fruit or barrels do not conform to the requirements is deemed misbranding, and if done knowingly renders the packer or seller liable to a penalty of \$1 per barrel and costs. The act does not become effective until July 1, 1913.

Provision was made in the Post Office appropriation act for investigations by a joint committee of Congress of the practicability of federal aid in the construction of post roads, and also for cooperative work by the Secretary of Agriculture and the Postmaster General in road improvement with a view primarily to increasing the effectiveness of rural mail delivery. An appropriation of \$25,000 was allotted for the Congressional investigation, and this Department was granted \$500,000 for use in States or local communities contributing double the federal allotments.

Other legislation provides for the collection of additional cotton statistics, and an inquiry into the general conditions of farm and other labor. As an attempt to demonstrate the possibilities as to growing spineless cacti for forage, Luther Burbank was granted the use of not to exceed 12 sections of semiarid lands for 5 years with the privilege of purchasing these lands at from \$1.25 to \$2.50 per acre if successful. The Food and Drugs Act of 1906 was amended by extending its provisions to false and fraudulent claims on the package or label as to the curative or therapeutic action of drugs. The Public Health and Marine-Hospital Service was designated the United States Public Health Service, and its functions extended to include studies of the diseases of man, sanitation, and related questions.

**Association of Official Agricultural Chemists.**—The twenty-eighth annual convention of this association was held in Washington, D. C., September 16 to 18, with a registration of 184 members and visitors.

The president of the association, H. J. Patterson, delivered the annual address, which dealt primarily with the part played by the association in the formation of the present system of agricultural colleges, experiment stations, and the development of modern agriculture. Attention was drawn to the advanced position occupied by the agricultural chemist of to-day, as compared with his status years ago. Special emphasis was placed on the necessity of standardizing college degrees conferred in chemistry, and of the chemical investigator of the present day having a working knowledge of an allied science, such as bacteriology or plant pathology. In addition, it was pointed out that a cooperative spirit should prevail between the chemists in the laboratory, as this will have a tendency to develop initiative, stimulate research, and prevent the development of routine work.

Assistant Secretary of Agriculture W. M. Hays presented the greetings of this Department. He pointed out the need that more scientific men, chemists and others, should be studying problems which relate to eugenics, and also advocated extension work in the sciences.

The referee and associate referee on phosphoric acid, H. D. Haskins and A. J. Fatten, reported a thorough study of the official volumetric method for the determination of both the available and total phosphoric acid in basic slag phosphate and a further study of the citrate of ammonia-magnesia-mixture method. In the determination of available phosphoric acid, using Wagner's method for making the citric solution of the slag, closely agreeing results were not obtained by the analysts. Of the various methods the official volumetric method gave

the lowest results, and the gravimetric method (official) gave the highest results when sulphuric acid was used as a solvent. Further work is to be done on these methods, with the same kind of slag. The committee appointed at the last session to study the availability of the phosphoric acid in Thomas slag phosphate also rendered a preliminary outline of methods, accompanied by blueprints for field, pot, and cylinder experiments.

The referee on nitrogen, C. L. Hare, reported the results of further study of a method for organic nitrogen activity and on the Salle method for determining nitrogen in nitrates. Four out of 5 sets of results obtained with the neutral permanganate method for organic nitrogen activity were in close agreement, and showed fairly uniform results in the hands of different analysts, without reference to the material used. The results with the alkaline permanganate method were not so uniform, except with treated feathers and mixed fertilizers. The Salle method is deemed worthy of further consideration.

H. B. McDonnell, as referee on potash, reported the results of cooperative work, using kainit as the test material. The results obtained with the platinum method were very satisfactory. The cobalt-nitrite method was not considered reliable in its present form, and the results thus far obtained with the perchloric acid method were low. Changes in the method of making the solution were also tested, with practically the same results as in the official method.

The associate referee on the availability of potash, E. E. Vanatta, reported on several samples of fertilizers which were known to contain mature ashes, using the official and J. L. Smith methods. The solubility of potash from such sources seems to vary inversely with the degree of heat employed in the furnaces used for burning the manure, and if the furnaces are too hot an insoluble silicate of potash is in all probability produced. In the sample less than one-half of the total potash was soluble when the official method was used. The results of some analyses of twigs and leaves from the peach tree are also included. A proposed modification of the official method for availability of potash was adopted, likewise a suggestion for making pot or plat experiments with potash of known organic origin and with inorganic forms.

G. S. Fraps, the referee on soils, reported on acidity methods of extracting humus, and a comparison of the Rather with the official method. It was decided that these various methods be studied further.

As a result of cooperative work done with inorganic plant constituents the referee, W. H. McIntire, recommended that the associate referee, B. E. Curry, be instructed to pursue studies with the Schreiber method for sulphur during the coming year. Unsatisfactory results were obtained with the oxalate method for iron and aluminum, and it was recommended that further study of this method be discontinued. The molybdate method was adopted as official, and a further study is to be made of its extension to the determination of calcium as oxalate and magnesium as magnesium-ammonium phosphate.

Following the report of the referee on insecticides, S. D. Averitt, the chromate method for total lead oxid in lead arsenate was adopted as official. The provisional methods for the analysis of lead arsenate were changed in accordance with recommendation 7 of the referee in 1910 and adopted as official.

L. F. Kebler, chairman of the committee on the testing of chemical reagents, reported a decided improvement in quality in the chemical reagents obtained by the Bureau of Chemistry during recent years. Many chemists, however, are still too willing to accept chemical reagents as delivered without questioning their purity.

The committees on the unification of analytical methods, fats and oils, and food standards were discharged.

The referee on water, W. W. Skinner, reported the results of cooperative work and recommended that the phenol sulphonic acid method for nitrites and the

reduction method for nitrogen as nitrates (optional) be adopted as official. The method for strontium and the colorimetric method for the determination of iodine and bromine are to be further studied.

A. S. Mitchell, associate referee on food adulteration, gave a résumé of the work conducted on food adulteration during the past year. W. E. Mathewson, associate referee on colors, recommended that the methods described for the qualitative separation of coloring matters be adopted provisionally and that work bearing on the separation and identification of these substances be continued.

A. H. Brynn reported on the proceedings of the Eighth International Commission for Uniform Methods of Sugar Analysis, held in New York September 10. The resolutions of the commission concerning the temperature of polarization and the use of a neutral bichromate of potash light filter cell were referred to the referee on sugar, W. E. Cross, for report at the next meeting. Following a recommendation from the associate referee on saccharin products, J. R. Chittick, the method for the determination of solids in molasses and other sugar products, by means of the refractometer, using Geerlig's table of equivalents and temperature corrections, but expressing the results as percentages calculated from the refractometer readings, was adopted as a provisional method.

The associate referees on vinegar and flavoring extracts, W. A. Bender and R. S. Hiltner, reported cooperative work in these subjects. A continuation of a study of the refractive index of the ether extract of paprika with particular regard for detecting added oils was reported by the associate referee on spices, E. W. Hiltz. He recommended that a method be devised for detecting an excess of seeds in paprika and that samples of prepared mustard be studied as to their crude fiber content. E. Clark, as the associate referee on baking powders, reported considerable difficulty in getting arsenic-free reagents for determination of arsenic in baking powders.

The associate referee on meat and fish, W. B. Smith, reported on the study of starch, ammonia, and nitrate determinations. He recommended that the Price method for starch be substituted for the Mayerhofer method, and the Folin method for the magnesium oxide method for estimating ammonia.

H. C. Gore, associate referee on fruit products, reported results of studies on the determination of malic and citric acid. With the Pratt method for citric acid duplicates were hard to obtain, as tartaric acid when present in considerable amounts seems to interfere. In the malic acid cooperative work the results obtained agreed well. A study was also made of the optical rotation of malic and tartaric acids, respectively, in the presence of varying amounts of acetic acid.

As to fats and oils, H. S. Bailey, associate referee, reported the results of a cooperative study of the glycerol method for the saponification of fats, and compared various procedures with the official method. The provisional method for the preparation of samples, the Zeiss butyro-refractometer method, method 12 for the determination of free fatty acids, the Halphen reaction for cotton-seed oil, the Baudouin test for sesame oil, and the Villavecchia test for sesame oil, all as given in Bulletin 107, revised, of the Bureau of Chemistry, were adopted as official.

The Emery method for the detection of added beef fat in lard, and the glycerol method for the preparation of fatty acids for use in the titer test, were made provisional, as was also the use of 75° as the temperature for use in the determination of the specific gravity of high melting-point fats.

A. E. Paul, as the associate referee on dairy products, reported a further study of his method for extracting fat from milk, cream, ice cream, evaporated milk, and sweetened condensed milk. The associate referee on cereal products,



H. L. White, reported cooperative work with methods for the estimation of wheat flour of soluble carbohydrates, gluten, gliadin, edestin and leucosin, azide nitrogen, nitrous nitrogen, moisture, and acidity of watery extract.

As regards condiments other than sauces, W. J. McGee, associate referee, reported cooperative work done almost wholly with tomato catsup. He recommended a method for the determination of lactic acid and the adoption provisionally of methods for the analysis of tomato products. The cooperative work on cocoa products, as reported by the associate referee, W. L. Dubois, concerned the determination of fat in chocolate, and total solids, crude starch, and casein in milk chocolate. H. E. Barnard, associate referee on preservatives, reported that his work had been almost wholly devoted to the detection and estimation of formic acid, which he considered more important at present than the study of better known preservatives.

The report of H. C. Lythgoe, associate referee on water in foods, dealt with the results of a comparative study between the official and vacuum methods, using different dehydrating agents, of which phosphorus pentoxide seemed to be the most feasible. H. M. Loomis, associate referee on heavy metals in foods, reported on the determination of tin in foods, principally by the Decolite and Lourie and the Schreber and Tabor methods.

The referee on the separation of nitrogenous bodies (meat proteins), A. D. Emmett, reported that the Kjeldahl-Gunning-Arnold method gave equally good results as the Kjeldahl method for total meat proteins. Additional data on soluble, insoluble, and coagulable nitrogen, creatin, and creatinin in meats and meat extracts were included in the report. The associate referee on vegetable proteins, T. B. Osborne, pointed out that present knowledge of the quantitative methods available does not yet justify definite recommendations. In view of the recognized difficulties, extended investigations were advocated, and a brief outline of a plan presented for undertaking them. A committee was appointed to consider these recommendations.

The associate referee on dairy products, L. I. Nuremberg, dealt with tests for distinguishing between raw and pasteurized milk and some recently proposed reactions for detecting old milk, viz. Schardinger's, Rothenfusser's, benzidin, and alcoholic precipitation (coagulation) with a reagent containing alizarin for approximating acidity. Bacterial counts were made in conjunction with the tests. Recommendations were made that the formaldehyde-methylene blue reaction, the methylene blue reaction, and the 88-per cent alcohol precipitation method be further studied.

The referee, W. J. Jones, and associate referee, C. S. Cathart, reported cooperative work on the analysis of feeding stuffs, which dealt mainly with methods for determining acidity and the petroleum-ether method for fat. In the study of acidity no close agreement among the results was obtained, and no apparent definite relation could be found between the acidity figures and the amount of protein. The petroleum-ether method for crude fat showed closer duplicates among the majority of analysts than the official method, but in all samples a lower average result. The official method is considered easier to conduct and to allow more perfect and rapid drying of the extract, but the petroleum-ether method more nearly gives the real amount of fat present, and was recommended for further study.

L. F. Kehler, the referee on medicinal plants and drugs, discussed methods of sampling and analysis, and the inadequate standards of the present time. Special stress was laid on securing proper samples and on the fact that sampling must be modified according to the nature of the goods to be tested. In drawing conclusions, all available means, such as physical, organoleptic, chemical, mechanical, and microscopical must be enlisted.

G. W. Hoover, associate referee on medicated soft drinks, reported satisfactory results in cooperative work in the determination of the constituents caffeine, cocaine, phosphoric acid, and total solids. W. O. Emery, associate referee on synthetic drug products, reported that in analyses of headache tablets a method had been devised for the estimation of caffeine, acetanilid, quinin, and morphin in the same preparation. Aspirin was also studied in regard to melting point, either alone or in admixture with salicylic acid. Salol was estimated satisfactorily with a standardized bromin solution. A. G. Murray reported cooperative work on the estimation of nitroglycerin in medicinal tablets, and H. E. Buchbinder on similar work with the Eaton method for morphin.

At the suggestion of W. D. Bigelow, a committee was appointed to edit a new issue of the official methods of analysis. Resolutions were adopted in memory of the late Director M. A. Scovell, of the Kentucky Station, and Prof. H. A. Weber, of Ohio State University.

The papers read during the session were as follows: A Proposed Modification of the Official Method for Determining Humus, by O. C. Smith; Application of the Ammonium Carbonate Method for the Determination of Humus to Hawaiian Soils, J. B. Rather; Note on the Analysis and Valuation of Maple Sugar, A. H. Bryan; A Proposed Method for the Determination of Tartaric Acid in Wines and Grape Juice, R. G. Hartman; The Composition of Vanilla Extract From Tahiti and Fiji Beans, A. L. Winton and E. H. Berry; A Probable Method for the Estimation of Optically Active Oils in Extracts, C. F. Poe; A Method for the Detection of Caramel in Tincture and Extract of Ginger, R. S. Hiltner; The Chloral Hydrate Test for Charlock, A. L. Winton; Determination of Starch in Meat Products, E. M. Bailey; The Modified Babcock Test for Fat in Sweetened Dairy Products and Ice Cream, J. O. Halverson; Determination of Lead in Cream of Tarlar and Baking Powders, Paul D. Potter; Determination of Nitrogen Activity by the Modification of the Neutral Permanganate Method, J. M. McCandless; A Study of the Lead Number of Asafetida and Allied Products, E. C. Merrill; Estimation of Morphin, H. E. Buchbinder; Comparison of Values Obtained for Refractive Indices of Aqueous Solutions of Ethyl and Methyl Alcohol, R. H. St. John; and Determination of Camphor by the Hydroxylamin Method, E. K. Nelson.

The officers elected for the coming year were as follows: Honorary president, E. W. Wiley, Washington, D. C.; president, G. S. Fraps, College Station, Tex.; vice president, E. F. Ladd, Agricultural College, N. Dak.; secretary, W. D. Bigelow, Washington, D. C.; additional members of the executive committee, C. H. Jones, Burlington, Vt., and R. N. Brackett, Clemson College, S. C.

**Agricultural Chemistry at the Eighth International Congress of Applied Chemistry.**—This congress was held in Washington and New York, September 4 to 12, under the patronage of the President of the United States. The papers presented before the section of agricultural chemistry were as follows: Factors Influencing the Composition of the Blood of Steers, P. F. Trowbridge and L. D. Haigh; Changes in the Composition of the Dairy Cow During Fattening Period, P. F. Trowbridge; Mineral Constituents of the New Born Calf, A. G. Hogan; Composition of Beef Fat as Influenced by Age and Condition of the Animal and Location in the Body, L. B. Morgan; A Study of the Cost of Maintenance and Growth and the Changes in the Composition of the Mature Beef Animal During the Fattening Period, C. R. Moulton; A Study of the Variations in Chemical Composition of the Timothy and Wheat Plants During Growth and Ripening, L. D. Haigh; Some Factors Influencing the Quantitative Determination of Arsenic in Soils, J. E. Greaves; Organic Phosphorus of Soil, J. Stewart; Plasticity of Clay, J. Stewart; The Composition of the Loess Soils of the Trans-Alien Region, F. J. Alway; Experiments with Reincubation of Steamed Soils,

T. L. Lyon and J. A. Bizzell; Conservation of Phosphorus in the Urine, P. L. Browning; The Effect of Sodium Mannres on the Percentage of Sugar in Certain Plants, B. L. Hartwell and P. H. Wessels; A Study of Soil Potassium, R. R. Curry and T. O. Smith; Composition and Digestibility of the Ether Extract of Fodders, G. S. Fraps and J. B. Rather; The Composition and Digestibility of the Chloroform Extract of Plants, G. S. Fraps and J. B. Rather; Soil Potash and Phosphoric Acid and Their Relation to Pot and Field Experiments, G. S. Fraps; The Effect of Fertilizers on the Composition of the Asparagus Plant, F. W. Morse; Calcium Arsenite as an Insecticide, E. B. Holland and L. C. Reed; The Combustible Gases Excreted by Cattle, J. A. Fries; The Metabolism of Cattle When Standing and Lying, H. P. Armsby and J. A. Fries; Error in the Babcock Butter-Fat Test of Fresh Milk Caused by Improper Diameter of Test Bottle Necks, J. C. Manchester; Field Test With Fertilizers, H. A. Hanks; The Manganese Present in the Normal Animal Body, G. Bertrand and F. Medigrecanu; Use of Manganese as a Catalytic Fertilizer, G. Bertrand; Use of Sulphate of Aluminum as a Catalytic Fertilizer, G. Bertrand and H. Aguilon; Use of Boron as a Catalytic Fertilizer, H. Aguilon; The Inheritance of a High Starch Content in Potato Tubers, P. de Vilmorin and F. Levaillois; Agronomic Study of Manganese, P. Nottin; Use of Zinc as a Catalytic Fertilizer, M. Javillier; Researches in Regard to Inorganic Fertilizers for Sugar Beets, A. Vivier; The Inheritance of Certain Imperfections in Gluten, L. Vanhar; Effect of Bichromate of Potash upon Milk when used at a Preservative, M. Vanflard; Nitrogen and Phosphoric Acid in Wheat and Wheat Flour, L. Vanflard; The Effect of Static Electricity upon the Development, Yield, and Composition of the Sugar Beet, R. Trnka; The Fertilizing Effect of Palmate Phosphate on Peat Soils, H. von Felitzien; Remarks on the Theory Concerning the Action of Fertilizers, A. Rindell; The Relative Effect on Plant Growth (a) of Sodium Carbonate, and (b) of Imperviousness in Soils, J. W. Leather; Determination of Permeability of Soils to Water, J. W. Leather; Contributions to the Colloid Chemistry of Milk, G. Wiegner; Stimulation of the Action of Calcium Cyanamid upon the Yield of Cultivated Plants by Iron, A. Strasser; The Composition of Kelps, J. W. Turrettine; The Salines of the United States as a Source of Potash, J. W. Turrettine, R. F. Gardner, and A. R. Mox; Organic Soil Constituents in Their Relation to Soil Fertility, O. Schreiner; Some Constituents of Humus, E. C. Shorey; Effect of Histidin and Arginin as Soil Constituents, J. J. Skinner; Normal and Abnormal Constituents of Soil Organic Matter, E. C. Lathrop; Biochemical Factors in Soils, M. X. Sullivan; The Extraction of Potash from Silicate Rocks, W. H. Ross; Alunite as a Source of Potash, W. H. Waggaman; Radioactivity of Soils, R. B. Moore; The Use of Ground Rocks and Ground Minerals as Fertilizers, W. O. Robinson and W. B. Fry; The Chemical Composition of Important Soil-Types East of the Mississippi, W. O. Robinson; Sponge Spicules in Certain Soils, Comparison of Rock Grinding With Balls and Cylinders, and Movement of Soil Moisture, R. O. E. Davis; Distribution of Fine Particles in the Soil, R. O. E. Davis and C. C. Fletcher; The Composition of the Soil Solution, F. K. Cameron; The Role of the Lysimeter in Soil Solution Studies, F. K. Cameron; The Phosphate Deposits of Continental North America, L. P. Brown; The Effect of Lime upon the Alkali Tolerance of Wheat Seedlings, J. A. LeClerc and J. F. Brown; Behavior of Amino Acids in the Soil, S. L. Jodidi; Soil Exchange Experiments on the Composition of Wheat, J. A. LeClerc and P. A. Yoder; Factors Relating to the Availability of Nitrogenous Plant Foods, J. G. Lipman, A. W. Black, I. L. Owen, and H. C. McLenn. The officers of the section were Frank K. Cameron, president; H. J. Wheeler, vice president; and J. A. LeClerc, secretary.

The Ninth International Congress is to be held in 1915 in Russia.

